ROADS and STREETS

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

Gillette Publishing Co., 33 West Grand Ave.
Chicago 10, Illinois

NOVEMBER 1955

Record Cement Treated Base Job

Gravel is Our Key Road Problem

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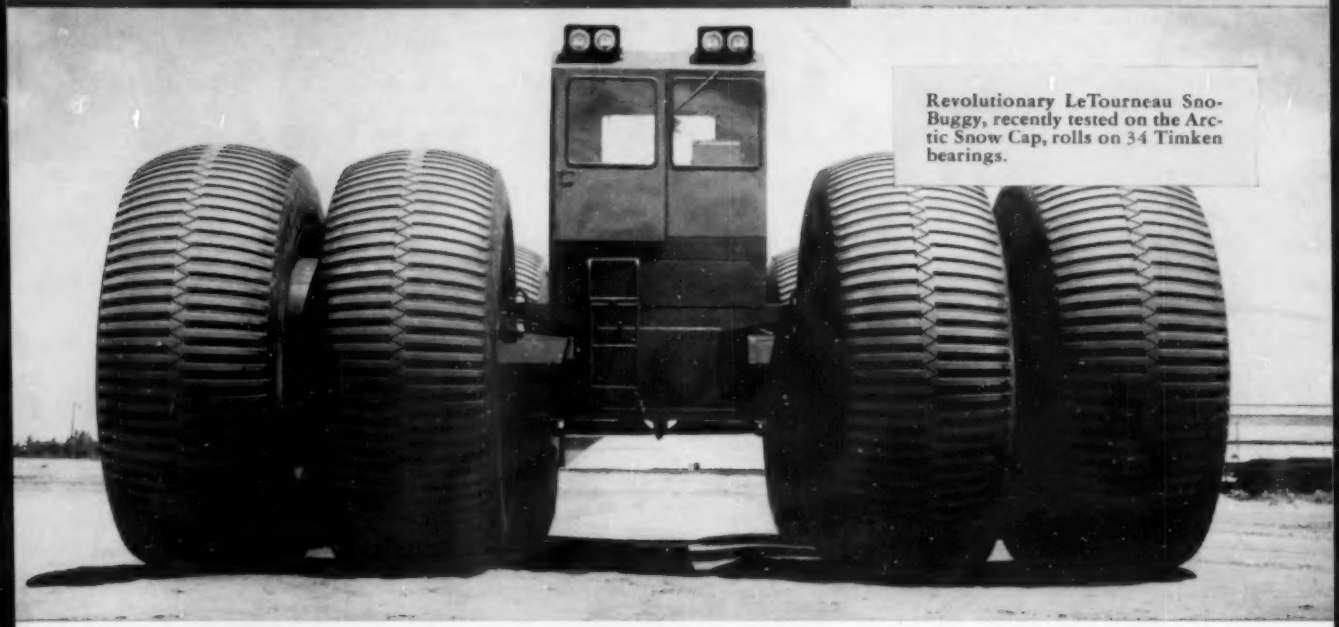
Accepted as Controlled Circulation Publication at Cedar Rapids, Iowa



Revolutionary LeTourneau Sno-Buggy, recently tested on the Arctic Snow Cap, rolls on 34 Timken bearings.

Whips world's toughest terrain, TIMKEN® bearings take 23-ton load

ROLLING on Timken® bearings, this amazing LeTourneau Sno-Buggy, designed and built by R. G. LeTourneau, Inc., Longview, Texas, "floats" over snowfields, swamps and desert sands on the world's largest tires . . . 10′ high and 4′ wide, carrying as little as 5 lbs. pressure. Its individually-powered electric wheels propel it forward or backward at 8 m.p.h. over terrain never traveled before.

Rugged service like this means that its bearings have to take tremendous radial and thrust loads. That's one reason LeTourneau engineers specified Timken tapered roller bearings. Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. They can take sudden shock loads, too, because their rollers and races are case-carburized to give them a hard, wear-resistant surface over a tough, shock-resistant core.

Line contact between rollers and races permits Timken bearings to carry the Sno-Buggy's heavy wheel loads. And the Sno-Buggy's huge dual tire wheels turn easily because Timken bearings are geometrically designed to have true rolling motion and precision manufactured to live up to their design. We even make our own steel to be sure of getting the best. We're the only U. S. bearing manufacturer that does.

Always specify Timken tapered roller bearings when you buy or build machines. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭

BEARING TAKES RADIAL ↓ AND THRUST →▯← LOADS OR ANY COMBINATION ✳

P&H MITI-MIT®® (Model 55TC) on road work in Colorado

P&H Model 155, ½-yd. dragline working near Tulsa, Okla.

P&H ...20 YEARS OF ALL-WELDED CONSTRUCTION

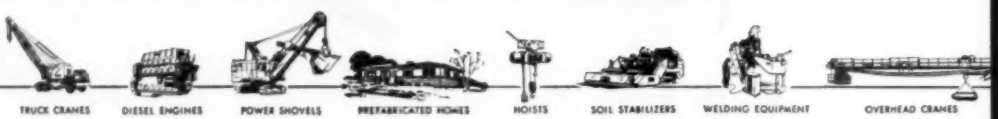
Harnischfeger Corporation produced the *first* all-welded excavator early in 1935. Why? Because 20 years ago, Harnischfeger realized that all-welded construction on excavators gave features such as these to P&H users:

1. The strongest construction known . . . stronger per pound of weight than comparable cast construction.
2. The best suited material for each component part of the excavator! The manufacturer is able to select the right combination of alloy steels for a particular function.
3. The elimination of dead weight! Thru a liberal use of alloy steels, it's possible to build up strength exactly where it's needed most. Gone are beefed-up, power consuming castings.
4. Revolving frame, including side stands, is built entirely of rolled steels and welded as a rigid unit, permitting machining as a single unit to insure perfect alignment.

Thru the years, thousands of P&H owners have enjoyed these cost-cutting advantages on their jobs. And, today, *P&H buyers have the added benefits gained in two decades of experience and know-how in all-welded construction.* See your P&H dealer or write P&H Power Crane and Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

the P&H Line



P&H 255-A trench hoe (¾-yd.) on ditching job in Quebec

255-A truck crane clears land for new road. Long Island, N. Y.

How Beth-Cu-Loy drainage pipe made this job easier

On this job the pull shovel that dug the trench doubled in brass as a hoist, in laying a section of 36-in. storm sewer. No need for a feather bed here, for this pipe was fabricated from galvanized Beth-Cu-Loy steel: tough enough to make mollycoddling needless, flexible enough to conform to irregular grade conditions.

A Beth-Cu-Loy drainage installation can be counted on to last the lifetime of the project. It can flex longitudinally or transversely to absorb changing loads caused by shifting soils or freezing action. Thus it can withstand greater impact and vibrational stresses than rigid materials.

Beth-Cu-Loy steel is extra-resistant to corrosion because it contains 0.20 to 0.30 pct copper. The galvanized coating is of Prime Western zinc and will satisfy the 2-oz triple spot test required. Culvert pipe made of Beth-Cu-Loy fully complies with the American Association of State Highway Officials and Federal Specifications adopted by most states.

Bethlehem manufactures the Beth-Cu-Loy galvanized corrugated and flat steel stock used by pipe producers. If you would like to have further information about Beth-Cu-Loy, or the names of those who fabricate it into pipe, just get in touch with the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

. . . for more details circle 182, page 16

IT PAYS OFF

to go from

...this

to...

DIXIE INSULATED WATER CARRIER and DIXIE CUPS!

- Cuts loss of valuable time!
- Steps-up job efficiency!
- Cuts contagion, fatigue accidents!

Special Dixie designs teach safety and caution!

DIXIE PORTABLE WATER CARRIER

Keeps Water Cool for Hours! Available with dispenser for Dixie Cups of your choice. Use in central location or carry with shoulder straps.

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"DIXIE" IS A REGISTERED TRADE MARK OF THE DIXIE CUP COMPANY

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ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

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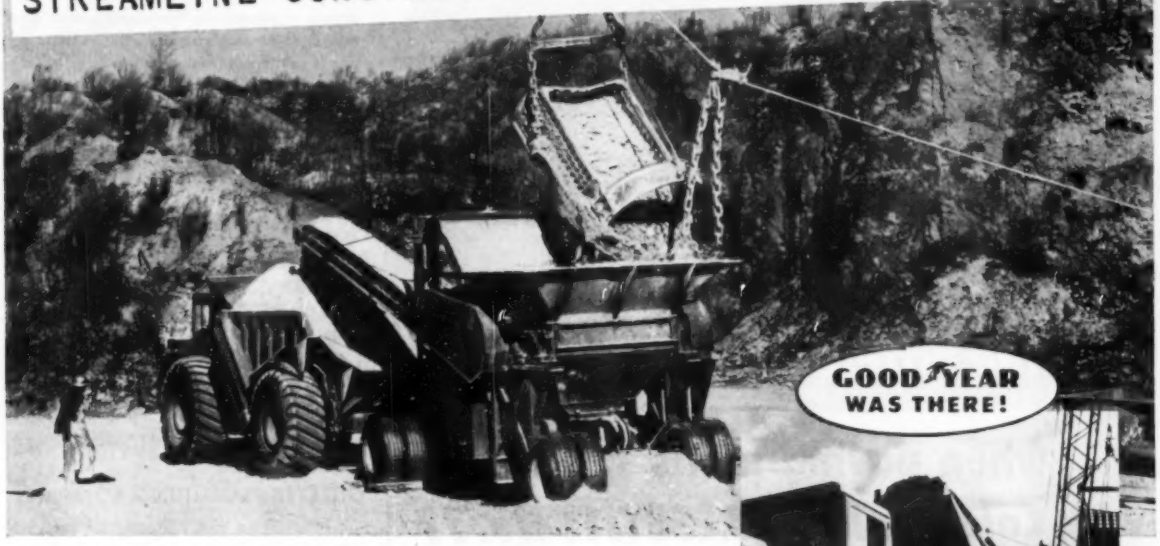
DUAL-DUTY TRUCKS AND RUBBER-TIRED ROCK CRUSHERS

STREAMLINE CONSTRUCTION-MINING COMBINATION!



WILLISTON SHELL ROCK COMPANY is a pioneer Florida lime miner, J. H. Craggs Construction Company builds roads of Florida lime—and the president of both firms is James H. Craggs, Jr.! This dual-identity works many economies—such as a fleet of trucks, suitable for mining OR earth-moving—and portable, rubber-tired rock-crushers that, from mine to destination, really cut handling operations. Goodyear Hard Rock Lug and All-Weather Earthmover tires are right at home with these fast-stepping outfits.

See what users say about Goodyear Tires built with 3-T NYLON CORD—

Bruise breaks, heat blowouts—practically things of the past! Excess stretch, flex failure, ply separation—virtually ended! Longer tire-life, more re-lugs and recaps—because 3-T Nylon Cord bodies stand up so much longer!

Less down time—lower tire-cost-per-job!

Yes, that's what *users* say, the men on the firing line, who have nothing to sell you—*but who have had up to 2 years' personal experience with 3-T Cord tires on some of the toughest jobs in the land!* And, since this exclusive Triple-Tempered Nylon Cord costs you no more than the same type *untempered* cord—there's nothing to stop you from specifying these great new Goodyear off-the-road tires, right NOW! Goodyear, Truck Tire Dept., Akron 16, Ohio.

Look for this sign; there's a Goodyear dealer near you

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE BUILT WITH 3-T NYLON CORD

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Road Lug, Sure-Grip, All-Weather—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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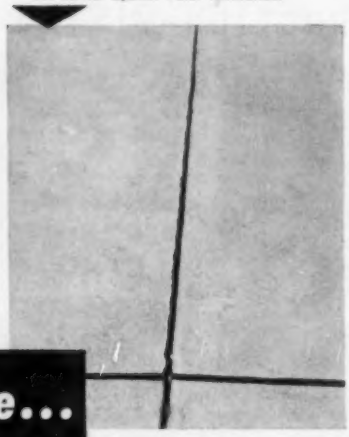
Old joint filled with a hot poured type sealer. Note cracks which permit water penetration through joint.

Tightly bonded joint uniformly sealed with cold applied Presstite No. 77, forming impervious barrier against water infiltration.



See the difference...

when paving joints are sealed with *Cold Applied* PRESSTITE No. 77

To reduce paving maintenance costs, resulting from havoc wrought by repeated expansion and contraction of pavement, Presstite's Research Laboratory developed a *cold applied* paving joint sealer... Presstite No. 77.

Proven on more and more highway and airport paving jobs, Presstite No. 77 has conclusively demonstrated its superiority for sealing joints in new pavement and for maintenance re-sealing. It remains flexible, resilient and adhesive, withstands repeated expansion and contraction of the pavement, and forms an impervious barrier against passage of water through the joints and into the sub-grade below.

Quick, easy and economical to apply, Presstite No. 77 remains tough and elastic under extremes of temperature and heavy traffic.

Here is a proven paving joint sealer that provides longer lasting, more satisfactory pavement service, resulting in greater maintenance economy.

WRITE TODAY for new catalog and full details on *cold applied* paving joint sealers.

Re-sealing runway paving joints at Davenport, Iowa, Municipal Airport. Presstite No. 77 is quickly and easily pumped under pressure directly from drum into joints.

PRESSTITE SEALING COMPOUNDS

PRESSTITE ENGINEERING COMPANY

3782 Chouteau Avenue **St. Louis 10, Missouri**

... for more details circle 252, page 16

ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 63 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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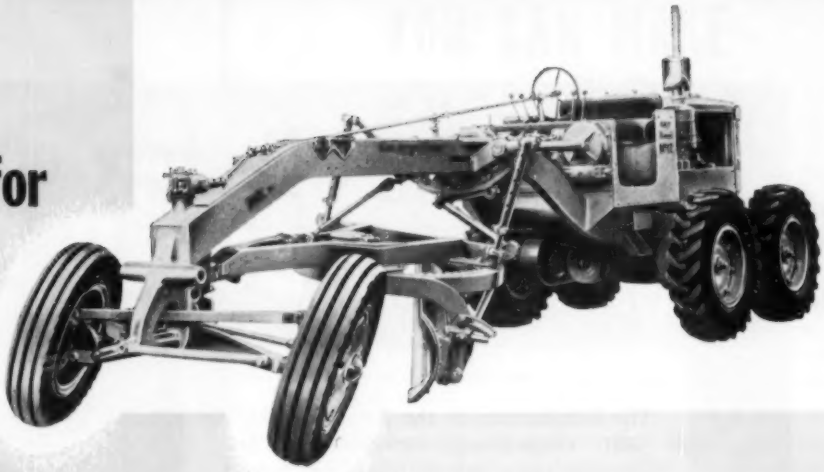
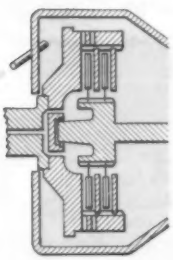
Exclusive new oil clutch for CAT* No. 12 Motor Grader can give you

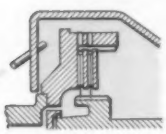


1500 HOURS without clutch adjustment

How the new oil clutch works



Crankcase oil is directed, under pressure, into clutch compartment through holes in flywheel. It is circulated by centrifugal force and returned to the crankcase by the flywheel ring gear. When the clutch is disengaged, cool oil surrounds the specially bonded cork facings.



As clutch discs move to engaged position, facings are "oil protected." Once engaged, they are completely free of oil.

Cork facings have a network of grooves that enable oil to escape during engagement. Oil constantly lubricates all moving parts.

Extensive tests have shown that clutch facings wear an average of only 2½ *thousandths of an inch per thousand hours of operation* with the new oil clutch for the Caterpillar No. 12 Motor Grader. Here are four good reasons why this new oil clutch can mean lower cost, better performance on *your* job:

1 LONG LIFE: new clutch facings greatly extend clutch life by reducing slippage. This is possible because of the high frictional qualities of the bonded cork facings. Since the clutch runs in oil, constant "oil bath" lubrication cuts wear on moving parts.

2 GREATER EFFICIENCY: clutch action stays smooth and "like new." Clutch "fade" due to overheating is practically eliminated, since facings are kept cool by engine oil.

3 EASY MAINTENANCE: nine months without clutch adjustment is not unusual in road maintenance work. Constant oil splash makes ordinary lubrication for clutch or throwout bearings unnecessary.

4 JOB PROVED: in exhaustive, on-the-job tests, this exclusive oil clutch in the No. 12 has delivered the same efficient, reliable performance as the thoroughly proved oil clutch on Caterpillar track-type Tractors.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE

. . for more details circle 187, page 16

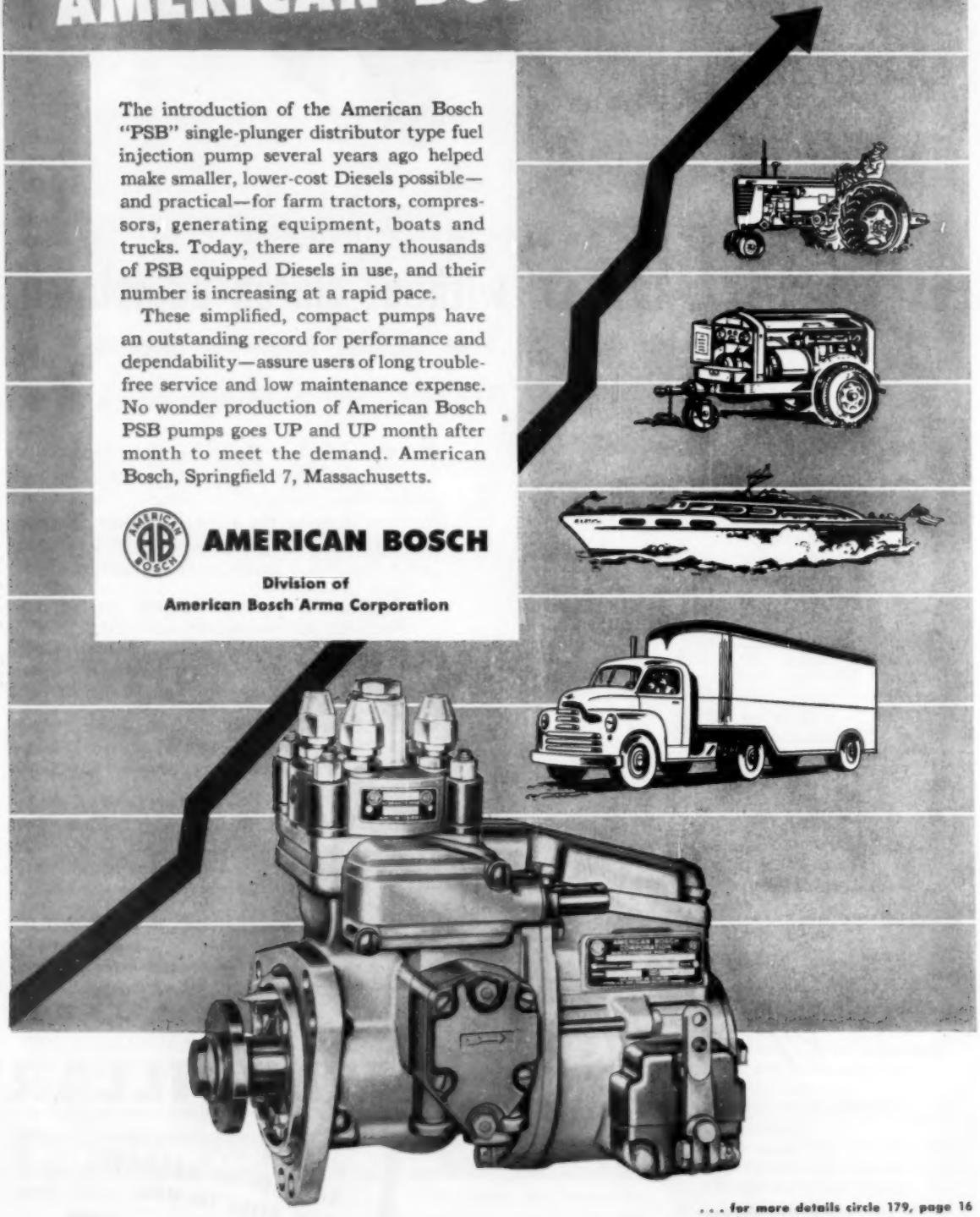
the UP and UP story on the AMERICAN BOSCH PSB!

The introduction of the American Bosch "PSB" single-plunger distributor type fuel injection pump several years ago helped make smaller, lower-cost Diesels possible—and practical—for farm tractors, compressors, generating equipment, boats and trucks. Today, there are many thousands of PSB equipped Diesels in use, and their number is increasing at a rapid pace.

These simplified, compact pumps have an outstanding record for performance and dependability—assure users of long trouble-free service and low maintenance expense. No wonder production of American Bosch PSB pumps goes UP and UP month after month to meet the demand. American Bosch, Springfield 7, Massachusetts.

AMERICAN BOSCH

Division of
American Bosch Arma Corporation



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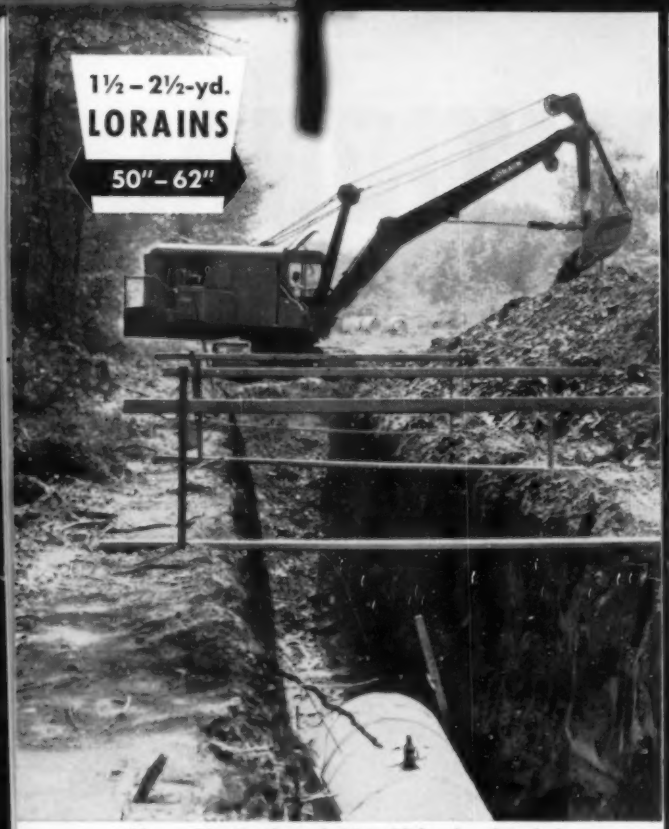


Above: Digging through 14 to 22 ft. of unshot shale.

Above: Digging through shot rock on the New York Thruway.

Below: This Lorain digs sewer trench through 12 ft. of rock.

YOU CAN MAKE *DOUGH* WITH A LORAIN HOE

Cost-conscious, profit-conscious contractors learned long ago that there is money to be made with Lorain Hoes on any kind of below-ground level excavating, whether it's for trenches, basements, footings, foundations or grading.

That's because, no matter what size Lorain you choose, Lorain Hoes are designed for the *extra* production that makes so much difference in the profit column. The booms are all-welded box sections for extra strength and weight . . . weight that gives the maximum "crowding" effort and stability to dig hard materials. Booms are tapered for maximum operator visibility in trenches—in maximum lengths with goosenecked "offset" for deeper digging ranges—and the buckets are non-heeling, clean-cutting, easy-dumping. Available in bucket widths from 20" to 62", in a range for each class of machine—mounted on crawler, Self-Propelled, or Moto-Crane carriers—there is the widest possible choice of sizes and mountings to fit your needs. Of course, Lorain hoe booms are easily interchangeable with clamshell, crane, dragline or shovel.

If it's a job for a hoe—big or small—let your Thew-Lorain Distributor show you why you can make dough with a Lorain Hoe.

FREE BOOKLET ON LORAIN HOES

See how contractors, large and small, make money with Lorain Hoes. Send for this booklet containing big pictures of Lorain Hoes in action with interesting job facts and figures. Write for your copy today!

THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN®

Below: This Dixie digs basements in red shale.

NEW INTERNATIONAL®

New International 300 Utility tractor with backhoe and loader combination, excavated and backfilled 800 yards of shale-type clay on 32,390 sq. ft. office and warehouse in Shreveport, La. Weight and balance of this new heavy-duty tractor adds greatly to stability when using heavy rear and/or front-mounted equipment.

DO MORE WORK WITH AN INTERNATIONAL 300

The rugged Model 300 tractor is ideal for special-duty equipment of all types. Here you see it powering a backhoe—a versatile digging machine for utility trenches, footings, septic tank installations, culverts, etc.

The Hydra-Touch control and fast hitch arrangement on the Model 300 make it easy to attach rear-mounted equipment such as this versatile leveling blade, which is often profitably combined with a front-end loader.

The low center of gravity, adjustable front and rear wheel tread, comfortable seat and all-around visibility of the Model 300 make it outstanding as a mowing tractor. Here you see it equipped with a hydraulic mower.

INTERNATIONAL HARVESTER®

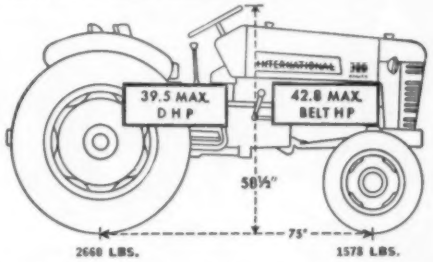
INTERNATIONAL INDUSTRIAL POWER

300 UTILITY TRACTOR

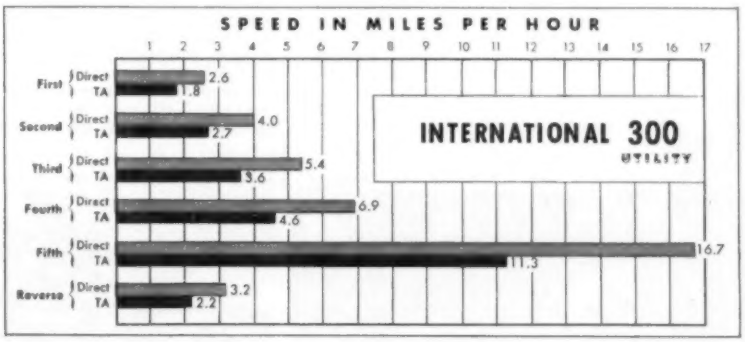
10 speeds forward with exclusive Torque Amplifier Drive... change speed, boost pull-power up to 45% *ON-THE-GO!*

Here's a new utility tractor that outperforms anything you've seen up to now. It has more *built-in* weight to deliver traction where lighter weight utility tractors slip or stall. Every pound is working weight—more powerful engine, stronger chassis, more rugged power train and axles, with power-weight balance to step up pull and push power. It's *all* tractor, built with characteristic IH stamina to stay on the job over the long pull!

The husky tractor delivers 39.5 maximum drawbar horsepower by official test—produces 4,379 pounds pull in low gear at part throttle. The new 300 is available in more ways and with more exclusive features than other tractors of its type. For example, it's available with a standard 5-speed transmission or you can also have it with optional Torque Amplifier drive which gives you *10* speeds forward—from 1.8 to 16.7 mph—and 2 reverse. In *any* gear, you can change speed and boost pull-power without touching the clutch, the throttle, or shifting gears! *Power is delivered to the rear wheels without interruption while changing tractor speed.* With TA *and* independent power take-off, you can change travel speed while keeping power-operated equipment at constant rpm.

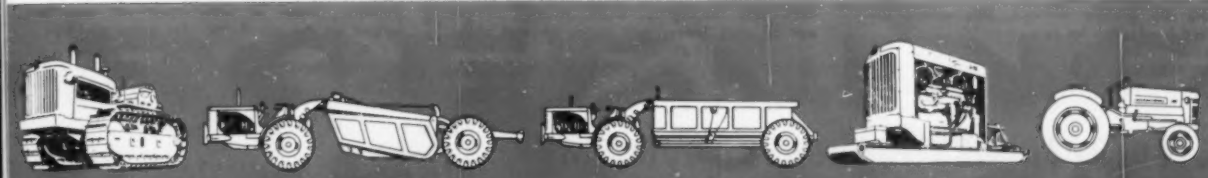


Unmatched traction and stability! Drawing shows power-weight balance of bare tractor—up to 1,000 pounds more built-in weight, with center of gravity only 25½ inches from the ground.



10 speeds forward, 2 reverse with IH Torque Amplifier*. Operator can increase or decrease speed, and boost pull-power up to 45 per cent *on the go* without declutching and shifting gears. He merely pulls back the lever (shown in the photo above) for instant boost in pull... pushes it forward to resume full speed on the go. **Optional equipment*

Sales and Service near your job... ANYWHERE... from the world's largest network of International Industrial Power distributors and dealers. Look in the classified... phone for an on-the-job demonstration. There's a *complete* line of McCormick and special-duty equipment to give the new International 300 *utility unlimited!* For illustrated folder, write International Harvester Co., Chicago 1, Illinois.



Crawler Tractors Payscrapers Paywagons Power Units Industrial Wheel Tractors

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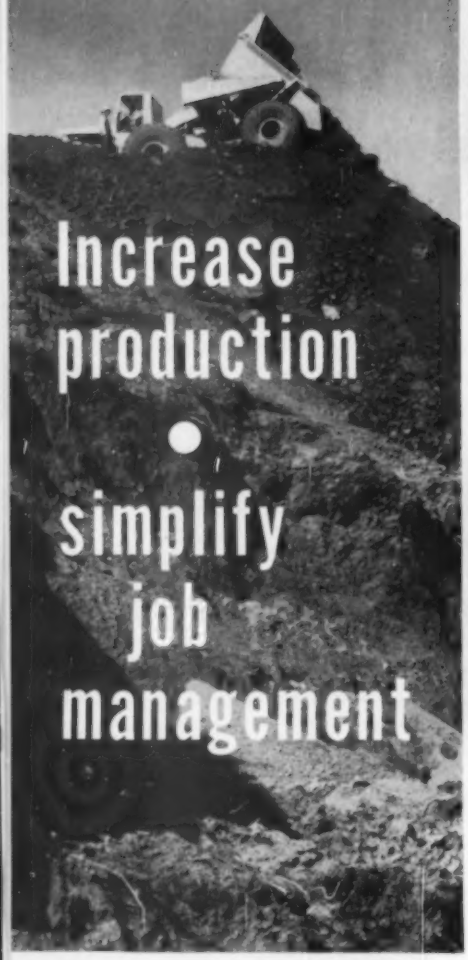


Increase production • simplify job management

Stripping for airfield extension, Bedford, Mass.

Removing overburden from coal mine in Malaya

Speed loading — Big, wide "target" areas make it easy for shovel or dragline operators to get faster loading cycles with these Rear-Dumps. Body opening on 9-ton size is 6' x 11', on 22-ton is 9½' x 10½', on 35-ton, 10' x 17'8". Rear of body provides a wide, low entry for the dipper to give extra speed advantage for the excavator. Low entry, plus wide body, reduces spillage. High, all-steel front guard protects operator, prime-mover.

Reduce time dumping — a touch of electric switch on operator's panel activates hoist motor . . . means a fast, safe dump. Independent brakes on front and rear allow operator to safely back to edge of fill . . . lock rear wheels and dump over edge . . . yet keep prime-mover in forward gear for safety and fast getaway. There is no delay for pressure to build up, no slow jacking by hydraulic pumps. Loads fall free and FAST!

Digging tunnel for new power plant in Sweden

Hauling quarry rock, Chattanooga, Tennessee

Work fast in tight quarters — positive power steer, 90° turns, electric controls, multi-disc air brakes that have more braking surface on a single wheel than most haul units have on all four wheels . . . all contribute to fast handling over steep, narrow, winding roads. Big tires roll easily over rough surfaces, steer easily out of ruts, give operator confidence to work fast even under the most difficult hauling conditions.

Cut maintenance troubles — because this machine has no hydraulic lift complications, no high pressure jack lines to keep tight, no long drive-shafts, no springs, spring hangers, or hinged steering connections, the most common maintenance problems of rear-dump haul units are eliminated. Owners in all parts of the world are reporting exceptionally high mechanical efficiency and low maintenance costs handling heavy rock and ore with them.

Digging railroad tunnel at Lodgeville, New York

Relocating U.S. Hwy. 1 in New Haven, Conn.

Loading shot limestone near Parker, Penn.

Operator comfort — from an employee relationship standpoint, as well as safety, this Rear-Dump is an asset to your organization. The big air foam cushion seat eliminates "bounce" . . . no "up and down" ride on these machines. Push-buttons on the instrument panel actuate electric motors that eliminate all manual work of steering. Fatigue factors are greatly reduced. This means increased production for you.

Cut weather delays — LeTourneau-Westinghouse Rear-Dumps keep hauling even when crawlers can't get through! Giant tires, 2' wide and up to 7' diameter, give ample flotation for soft going. When a wheel slips, power-proportioning differential applies 4 times the pull to wheel on firmest footing. Independent power steer turns prime-mover to seek new footing for better traction to pull out of mud holes, soft sand, or wet snow.

Insure future earnings — Behind the 2-wheel prime-mover, you easily interchange LeTourneau-Westinghouse scrapers, bottom-dump haulers, cranes, flat-bed trailers. This gives you a plus in insurance of steady earnings in any season and any time. And, any additional trailing unit is available anytime at only approximately 25% of the initial cost! Bulldozer blade or snow plow can also be added on the small "D" for extra profits.

R-694-G-b

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

PRESTRESSED CONCRETE OFFICE BUILDING

MULTIPLE STORY - CONTINUOUS DESIGN

Office building for United States Fidelity and Guaranty Company, Richmond, Va. . . . Architect, J. Henley Walker, Jr.; Structural Engineer, Wm. J. Blanton; Prestressed members by Concrete Structures Incorporated; General Contractor, Daniels Construction Company, all of Richmond.

COMPLETELY PRECAST and finished months ahead of the best estimated schedule for other materials, this structure cost the owner only $1.62 per square foot per floor level in place.

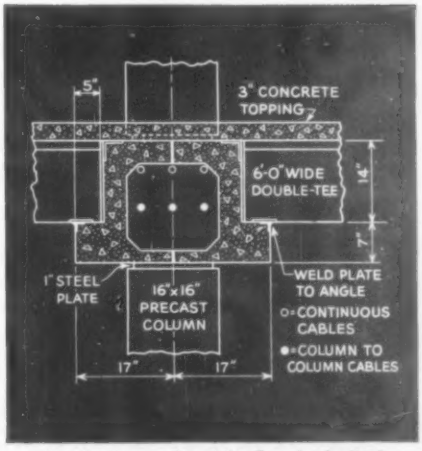
Precast reinforced columns, 32′ on centers, have steel plates welded to girder plates creating a rigid frame.

Hollow girders, precast in halves and assembled into 32′-long members post-tensioned with three cables before erection, have three additional continuous cables added after erection. Hollow was filled with grout after tensioning. Cables are Freyssinet type, each composed of eighteen 0.196″ diameter Roebling prestressed concrete wires.

Each 6′-wide double tee floor section, supported on girders 33′-4″ on centers, is stressed with sixteen ⅜″ diameter Roebling uncoated 7-wire stress-relieved prestressed concrete strands, pretensioned and bonded. Roof double tees have twelve ⅜″ strands.

All precast concrete is 6000 psi ultimate.

Roebling engineers will be glad to give you full information on tensioning materials and fabrication methods. In addition, they are ready to cooperate with you to help attain top efficiency on any given application of this modern and economical structural material. Contact Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.



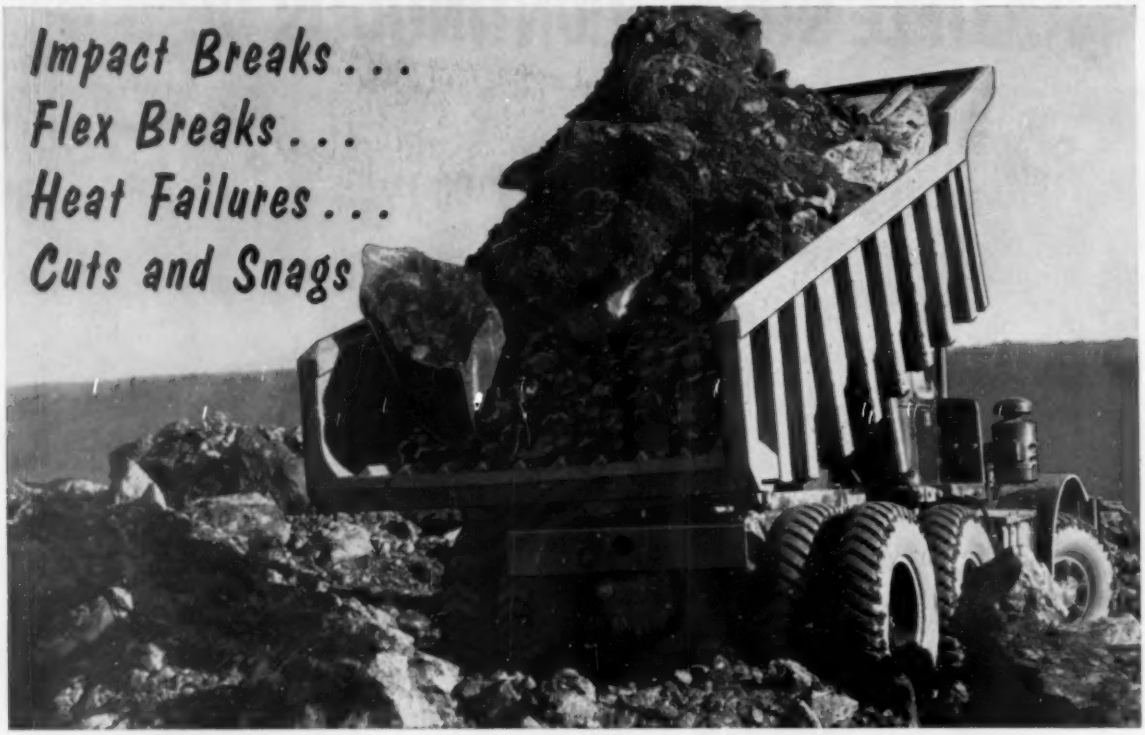
Details at ground and 1st floor levels. Roof members are similar but have less prestress.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

. . . for more details circle 254, page 16

CUT HIGH TIRE COSTS DUE TO . . .



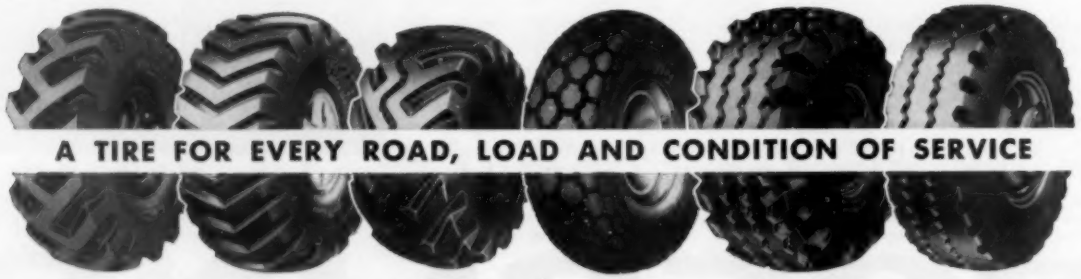
with Firestone Nylon Tires

FIRESTONE Nylon Off-The-Highway Truck Tires are built to deliver more hours of service on the toughest rock work, earth moving or strip mining job.

The Firestone Safety-Tensioned Gum-Dipped* nylon cord body with four extra tread plies absorbs toughest impact shocks. It gives the greatest protection against flex breaks, heat failures and damage due to cuts and snags.

You keep your downtime at a minimum with Firestone Nylon Tires. The treads give maximum traction and they are extra tough to resist cutting. The sidewalls are double thick to give added protection against costly sidewall injury.

Let your Firestone Dealer or Store show you how Firestone Nylon Tires can cut your tire costs.



A TIRE FOR EVERY ROAD, LOAD AND CONDITION OF SERVICE

GROUND GRIP • ROCK GRIP • TRACTION ROCK • ALL NON-SKID • ALL TRACTION • RIB EXCAVATOR

When you buy new equipment or replacement tires, specify FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over ABC

Copyright 1955, The Firestone Tire & Rubber Co.

. . . for more details circle 200, page 16

Takes shortest route to job . . . via highway or cross country . . . cuts hours from job-to-job moves.

Drives through city without interference to traffic, turns sharp corners, maneuvers easily in tight quarters.

Safe in traffic with big brakes, finger-tip control. Tires do no damage to blacktop, curbs, sidewalks.

Saves hundreds of dollars

by driving job-to-job under own power

A major advantage of rubber-tired Tournatractor is the 19 mph on-the-job and between-job mobility it gives you. With this machine, you drive anywhere under your own power. Big low-pressure tires do no damage to pavement, curbs, sidewalks or railroad tracks. You don't need planking to cross blacktop. You save the time, bother, and expense of locating a trailer, moving in extra men and extra transport equipment, loading and unloading, etc., etc.

When it's time to move from one job to the next, your operator starts as soon as the last yard is in place, drives down the highway, right through regular traffic, at speeds up to 19 mph. 50 miles is only 3 hours away . . . and you go right to work when you get there.

Then, if there's a call for tractor services at the other end of your job, Tournatractor hurries there, traveling up to 1,670 feet per minute. Often it can go, complete the work, and be back at its starting point, before a crawler gets to the site.

Figure out for yourself what this means in dollars:

1. Greater speed on the job that completes each assignment faster.
2. Roadability that cuts moving costs and reduces the non-pay hours of moving time.
3. Fast one-man moves that make it easy to keep Tournatractor profitably busy at all times, that let you fill in with small jobs between big ones with no stand-by losses.
4. Long range drive-yourself mobility and versatility that lets you move with the seasons, find year-round earnings when you need them.

Write or call us for more information on this versatile, high-speed tractor-on-rubber. Ask for a demonstration on your job. See for yourself what Tournatractor can do to speed your dozing, towing and pushing jobs.

Crosses tracks without damaging ties, tripping signals, tearing rails loose, or injuring tires.

Can haul own fuel wagon, other supplies. Self-sustaining on job, eliminates need for service trucks.

Tournatractor—Trademark T-735-G-b

FREE . . . A new 28-page book, showing all the ways Tournatractor will increase your production while lowering your costs. To get your copy, simply fill out coupon. Mail today to LeTourneau-Westinghouse Company, Peoria, Illinois. There is no obligation.

. . . for more details circle 275, page 16

Send to: LeTOURNEAU-WESTINGHOUSE COMPANY, Peoria, Ill.

Your name _____

Title _____

Company _____

Address _____

Street, City, State

T-735-G-b

WHAT'S NEW in Equipment and Materials

Vinyl Plastic All-Purpose Paint

A new one-coat vinyl plastic all-purpose paint, suitable for both interior and exterior applications, has been announced by The Wooster Sealkote Co., Wooster, Ohio.

Known as "Seal-Kote" (T. M. Registered), the ready to use liquid paint can be applied on either wet or dry surfaces, according to the manufacturer. When used on damp masonry, inside or out, it is reputed to prevent further water penetration. However, Seal-Kote is said to be so formulated as to permit free and constant "breathing" through its plastic film, thus releasing all internal moisture. Seal-Kote is recommended for use on cement and cinder blocks, concrete, brick, wood, plaster, wall board, celotex, stucco, all types of masonry — even over wallpaper.

An important feature claimed for Seal-Kote is resistance to mild industrial acids, alkalis, grease, oil, fats and dirt. It does not bleed or discolor when applied over asphalt.

For more information circle 101 on Service Coupon this page and mail now.

Effectiveness of Ice Rem Increased

Effectiveness of ICE REM, ice and snow melting pellets, is increased by the addition of a new chemical ingredient, according to Speco, Inc., 7308 Associate Ave., Cleveland 9, O. The new element, said to retard rust action and increase storage life, consists primarily of a specially formulated "essential" oil. It is reputed to create a moisture seal within the container and to prevent chemical decomposition. As a result, storage life is lengthened and danger of loss when warehousing between seasons is eliminated.

Use of the new ingredient is also said to stimulate action of Ice Rem's Speconite phosphate-type rust inhibitor. Consequently, it safeguards against excessive rust in the deicing of metal pipes, drains, downspouts, railway switches, metal loading ramps and curbs. When used on drives and streets, it retards rusting on automobiles, trucks, buses and road machinery.

For more information circle 102 on Service Coupon this page and mail now.

Coil Chain Ratchet Lever Hoists

Two light but powerful coil chain ratchet lever hoists have been introduced by Coffing Hoist Division, Danville, Ill., of the Duff-Norton Co. The hoists are models L-1½ (Capacity: 1½ tons) and LD-3 (capacity: 3 tons). Reduction is achieved through specially-designed, patented compound levers instead of gears.

The two new hoists are made either in malleable iron or aluminum alloy. Model L-1½ in malleable iron weighs 26½ lb., only 20 lb. in aluminum. Model LD-3 is 34½ lb. in malleable iron and 28 lb. in aluminum. Model L-1½ is single chain with a standard lift of 56½ in., minimum distance of 14 in. between hooks and requires a lever pull of 60½ lb. to lift the rated capacity. The double chain LD-3 has a standard lift of 57 in., minimum distance of 18⅝ in. between hooks and takes a lever pull of 62 lb. to lift the rated capacity.

For more information circle 103 on Service Coupon this page and mail now.

Two New Mack Trucks

For heavy dumper work — up to 8 yd. struck capacity — two new models, the B-60X, gasoline powered, and the B-61X, diesel powered, have been introduced by Mack Motor Truck Corp., New York 1, N. Y. Rated at 46,000 lb. gross vehicle weight, they are offered with a 158⅝ in. wheelbase, adapted to 10-or 11-ft. dump bodies. Standard tires are 11.00-24, 14-ply, single front and dual rear, on 8.5 rims, mounted on steel-spoked wheels.

For the gasoline-powered model, Mack's Thermodyne EN-464A engine, of 185 h.p., is supplied, with a choice of the standard five-speed, direct-in-fifth transmission, or a nine-speed Duplex overgeared wide-range type. The diesel-powered model uses the Mack Thermodyne, diesel, END-673, of 170 h.p., with a choice of a five-speed, direct-in-fifth as standard, with the option of a Duplex, wide-range nine-speed over-geared transmission.

Rear axles in both models are massive dual reduction units, equipped with radius rods and torque arms. Service brakes, are air-actuated, with a total area of 710 sq. in., rear drums being 17⅞ by 6 in. The hand brake is of the internal-expanding type, located on the transmission tailshaft with 139 sq. in. of area.

For more information circle 104 on Service Coupon this page and mail now.

More equipment news pages 112-122

Protective Coating for Blacktop

Meco "Black Knight" Surface Sealer, a pitch emulsion that is insoluble in oils and gasoline, can be quickly applied, and improves and protects the surface of blacktop paving, has been developed by Maintenance Engineering Company, 16 W. Johnson St., Philadelphia 44, Pa. The product is claimed to prevent softening and disintegration of bituminous concrete due to attack by oils, greases, gasoline, jet fuel and weather. It is now available from stock in three colors — charcoal, green and red.

For more information circle 105 on Service Coupon this page and mail now.

For more items . . . see page 112

MAIL THIS COUPON TODAY!

ROADS & STREETS
22 West Maple Street
Chicago 10, Illinois

CIRCLE THE NUMBERS AND MAIL NOW!

Please send me further information on products and materials mentioned in the November Roads & Streets as circled below

About New Equipment and Literature:								**101**	**102**	**103**	**104**	**105**	**106**
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Name_____ **Title**_____

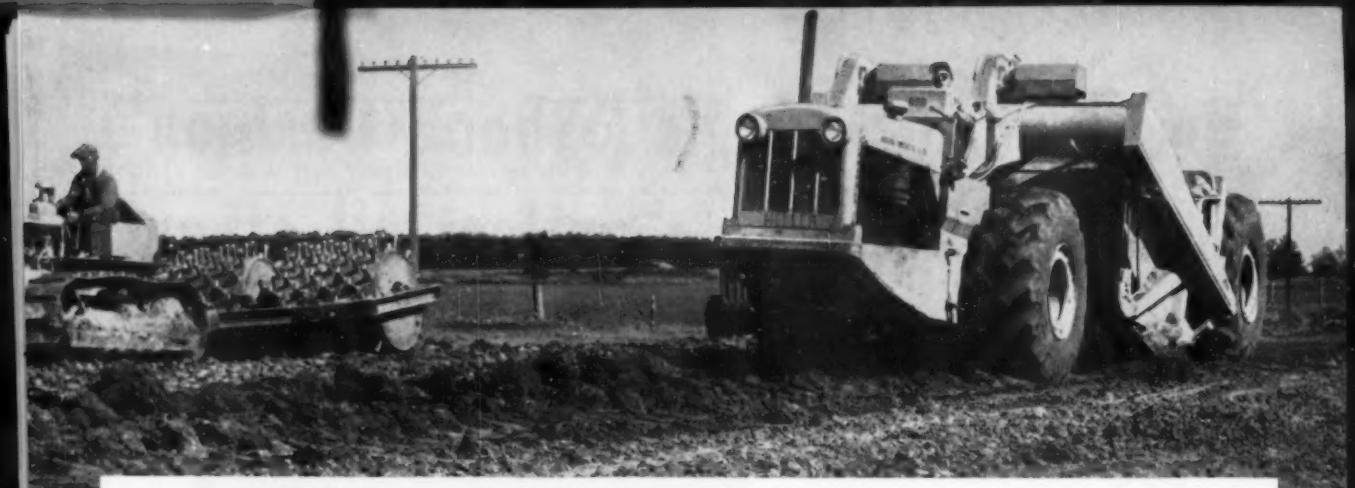
Firm or Gov't. Dept._____

Street_____

City_____ **State**_____ **11-55**

NOT GOOD AFTER DECEMBER 15, 1955

A READER SERVICE FOR YOUR NEEDS



8200′ cycle every 7½ minutes

Canadian contractor reports this includes time for leveling fill, blading haul road

Assiniboia Construction Co., Ltd., Calgary, Alberta, had to move 1,000,000 cubic yards to rebuild 23 miles of Highway 11 between Sylvan Lake and Condor. Hauls were long — 2,000 to 9,000 ft. one-way — and road had to remain open to traffic. To help meet these conditions, contractors drove in 3 C Tournapulls to handle 75% of the work.

In spite of traffic interference, these electric-control machines maintained a high rate of production. Time studies made when the "C's" were hauling 4,100 ft. one-way show each averaged 6.6 loads per 50-minute hour. With loads in the sandy clay averaging 12 pay yards, the 3 units delivered 238 pay yards hourly.

Scrapers take place of bulldozers

Average cycle of 7.5 minutes included time to blade fill. This was done by the Tournapulls after each spread. Units maintained haul road in same way, blading every 4th or 5th return trip. Need for bulldozers was thus eliminated. "C's" also helped 2 small tractor-drawn sheepsfoot rollers attain a compaction factor of 90 modified Proctor, the big Tournapull tires packing material in normal travel across the fill.

"5 trips hourly on 1½-mile haul"

The time-study figure of 79 pay yds. per "C" per hour on an 8200′ cycle compares well with contractors' own figures, according to Gen. Supt. V. Loewen. He says: "On a 3-mile cycle, each Tournapull can haul about 60 yards an hour. That's a conservative estimate."

"From what I've seen of comparable equipment," Loewen adds, "Tournapulls are as good a buy as you can get. You can take dirt out of the ditch, and put it on the road alongside cheaper with a Tournapull than with a crawler. They're easier on operators, too."

Faster, too, one operator added. The 3 Tournapulls, he said, drove the 255 miles from Taber to Sylvan Lake over main highways in 14 hours. That's an average of 18 mph.

Performance earns repeat orders

The Assiniboia organization are real experts on Tournapulls. They bought their first 4 Super C's in 1938, the year Tournapull introduced high-speed dirtmoving on rubber. More Tournapulls and other LeTourneau-Westinghouse dirtmovers followed . . . the electric-control "C's" described here in 1950, and a 7-yard "D" in 1949.

By now you have seen dozens of LeTourneau-Westinghouse repeat-order reports like this. It will pay you to investigate the facts for yourself. Call us soon. We will be glad to arrange a Tournapull demonstration on your job. There's no obligation.

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

How Hydro-Spring's "Shock Cushion" Helps Skid-Shovels outlast all others

by 25%

"Hydro-Spring design not only increases production—it also decreases abuse to both machine and operator," reports H. C. Patty, Birmingham, Alabama, owner of this concrete-shattering outfit!

Slam this super-stout bucket into compacted material, and you generate impact stresses that make unprotected front-end loaders shudder!

But International Drott Skid-Shovels smother these shocks enroute, before they can sprain a sacroiliac, strain a track frame, or maim a final drive! Machine-mauling shock stresses "lean" against exclusive Hydro-Spring's "magic cushion"—and they're absorbed!

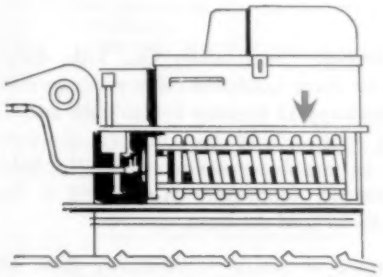
No Strain! No Pain!

You apply the patented pry-action break-out—and you get up to three times as much material-loosening, bucket-cramming force as the ordinary front-end loader can muster. Even then, shock-swallowing Hydro-Spring wards off strain and pain! *Owners declare that Hydro-Spring adds a whopping 25 per cent to loader and tractor life—reduces downtime and boosts production, too!*

No other front-end loader has Hydro-Spring advantages—which you get in four big-capacity, contractor-proved International Drott Skid-Shovel sizes. Why not ask your International Drott distributor for a demonstration of the money-making size best suited to your needs?

INTERNATIONAL HARVESTER

INTERNATIONAL® DROTT



How exclusive Hydro-Spring works and saves for you!

Exclusive Hydro-Spring is a hydraulic cylinder enclosed in a heavy-duty coil spring. Shock force displaces oil from main lift cylinders into the Hydro-Spring cylinder—extending it and compressing the big spring to *absorb* and *cushion* impact loads. Hydro-Spring reduces the consequences of shock forces *by an actual 67 per cent or more*—also eliminates most hydraulic hose failures!

. . . for more details circle 282, page 16

ROADS AND STREETS
Sixty-Three Years of Editorial Leadership

Washington News Letter

By Duane L. Cronk

November 15, 1955

Prospects for Congressional action on a national roadbuilding program next year were brightened last month by Secretary of Commerce Weeks' declaration that the Administration "would accept bond financing or a program supported entirely by taxes, or a combination of both" in order to win enactment of a multi-billion dollar highway program. Although the Administration still favors the bond financing program, he said, it is prepared to make any reasonable concession to obtain the needed legislation next year.

Mr. Weeks urged businessmen not to oppose tax increases on highway users that are "fair and equitable across the board."

Speaking in New Orleans last month, Undersecretary of Commerce for Transportation, Louis Rothschild, reported that a new high-level push is on to reach accord between the Administration and Congress before January, and that a decision on financing will be reached in the next season.

* * * *

From another quarter, Senator Bush of Connecticut, who was one of the most vocal promoters of the Eisenhower "grand plan" of bond financing the National Interstate System in the last session, has indicated that he will support a compromise to get action soon. It has been reported that 30 different Congressmen are writing compromise bills.

* * * *

Truckers, meeting in Washington last month at the American Trucking Association's convention, again declared they would accept "across the board" highway user tax increases, but that the trucking industry would "rise again and show its strength" if threatened with "discriminatory" taxes in the next session of Congress.

* * * *

The interim period of uncertainty has slowed up billions of dollars worth of road scheduling, the American Municipal Association believes. A survey of 100 cities of over 50,000 population revealed that 127 projects totaling $5.5 billion were "adversely affected" by failure of Congress to pass a law last summer that would give more federal money for urban projects. City highway plans are being delayed pending a decision on whether federal aid will continue at the present 60% rate or be boosted to 90%.

(continued on next page)

City engineers were cheered last month, however, by approval finally of 2,300 miles of National Interstate System routes into and around urban areas. The action permits officials in 102 localities to complete final route determination studies and move a great number of big projects that much closer to the construction stage.

Many would be costly, $10-million-per-mile jobs, so necessary to ease city traffic jams. Next step is selection of exact location by origin and destination study and survey. Then states may apply for federal aid, expected to go to 90% if a national road construction plan is adopted.

* * * *

Clarifying the stand of the highway construction industry on a national roadbuilding program, the American Road Builders Association spelled out a new statement of policy last month.

In the position ARBA took, it made the following recommendations:

- That no undue preference should be given to the National Interstate System to the neglect of the others, but the needs of all systems could, and should, be provided for within a 10-year program.

- That the federal government should continue to extend 50% of the funds necessary to improve the primary, secondary and urban federal aid highways, but should assume 90% of the cost of the interstate system.

- That financing of an accelerated highway program should be through Congressional authorizations upon general funds as in the past, and not be tied to any specific source of revenue.

- That the federal government, in a ten-year program of expanded aid, should provide $21 billion for interstate routes (to be matched by $2 billion in state and local funds) and $7.5 billion for secondary routes (to be matched by $7.5 billion in state and local funds). The total program - $68 billion.

ARBA reaffirmed its position in opposition to some sentiment that the National Interstate System be given privileged attention and that the construction program be extended over 15 or 20 years.

* * * *

A determined stand against application of federal labor laws to highway work was taken by the Associated General Contractors in convention last month. The AGC believes that adoption of the area prevailing wage philosophy in roadbuilding would cause unprecedented labor problems for contractors and would burden state highway departments and the Bureau of Public Roads with red-tape.

ROADS AND STREETS
Sixty-Three Years of Editorial Leadership

Special On WASHO Test

By Duane L. Cronk

November 15, 1955

One of the most important recent developments in highway research was unveiled in Washington late last month when the Highway Research Board released its findings on the WASHO road test. The results reveal considerations that will undoubtedly affect future highway design.

Constructed out in southeastern Idaho, the test road was on a location representative of many western areas. It consisted of two separate loops, each divided into 24 sections of various combinations of flexible surfacing, base and subbase. Total thickness of these 300-foot sections ranged from 6 to 22 inches.

Each loop was composed of two 12-foot lanes. A truck of specified weight was assigned to each of the four lanes. Together they rolled up a total of more than 980,000 trips in 570 days. Two were single-axle vehicles (18,000-lb. and 22,400-lb. respectively) and two were tandem-axle (32,000-lb. and 40,000-lb. respectively).

* * * *

Primary test objective was to determine the effect of controlled traffic upon flexible pavements of various structure. The Board's investigation also revealed:

- Important difference in durability related to asphalt thickness.
- The amount of protection that paved shoulders provide.
- The effect of traffic during "critical periods" as compared to other times.
- New data on comparison of damage by trucks of various weights and the minimum pavement thicknesses necessary to provide for them.
- The effect of vehicle speed upon the pavement.

* * * *

By operating the big trucks over the test road during portions of 1952, 1953, and 1954, the HRB built up exhaustive data on pavement performance.

(continued on next page)

Last month, after weeks of analysis, it reported these findings to the roadbuilding industry:

- Most surprising finding perhaps was that various pavements with 4-inch surfacing were "far superior" to those with 2-inch surfacing. For example, while an 18-inch design thickness with 4-inch surfacing would be more than adequate for the assumed traffic, the same structure with 2-inch surfacing would be inadequate.

- 22,400-lb. single-axle trucks caused 13.8% more damage than the 18,000-lb. single-axle trucks, and 40,000-lb. trucks were 48% harder on the test road than 32,000-lb. trucks.

- 90% of the failures in the test pavements developed during the "critical" (wet weather) periods under only 28% of the total traffic.

  Structural distress was particularly accelerated during two periods. From June 11 to July 7, 1953 (four weeks), 27% of the total damage developed, although only 0.7% of the load applications were made during that time. In the other period, February 17 to April 7, 1954 (seven weeks), 40% of the total distress developed, although only 13% of the applications were made during this period.

  (Conversely, 45% of the total number of load applications were made from July 24 to November 21, 1953, but only 1.6% of the total damage was incurred then.)

  The Board concluded that adverse conditions during brief critical periods are of more importance in establishing design requirements than traffic itself.

- Paved shoulders were definitely beneficial in prolonging pavement life, because of the waterproofing protection and lateral support they afforded. Pavements with paved shoulders were found to be as durable as pavements four inches thicker without paved shoulders.

- Where pavement surface was relatively smooth, deflections in the pavement decreased as speed increased. This was notable only up to 15 miles per hour, however, and then the decrease was slight.

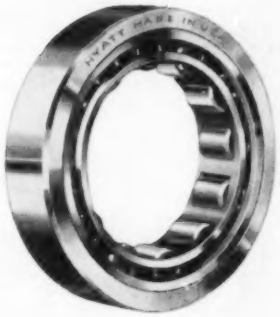
- Deflection of the flexible pavements was significantly influenced by the moisture content of the uppermost layer of the basement soil.

* * * *

The $890,000 research project was a joint venture in which the western states contributed funds, the Bureau of Public Roads contributed personnel and instrumentation, manufacturers loaned trucks and trailers, and oil companies provided fuel and lubricants. The Highway Research Board operated the test.

HYATTS HELP MAKE GIANT D9 CAT LIGHT-FOOTED

Caterpillar utilizes Hy-Loads in transmission and final drive of new D9, world's biggest crawler tractor



In announcing this 28-ton addition to its famous line, Caterpillar Tractor says it was designed to be a "*light-footed giant, with every part aimed at the kind of service which is too tough and too rugged for other tractors.*" No wonder we're proud that HYATTS were selected to shoulder so much of the shock-load in the D9's final drive and transmission!

When you realize that the new turbocharged engine in this tractor develops *230 drawbar horsepower*, you know what brutal punishment those bearings must bear. But Caterpillar knows, too, from long experience, that HYATTS can handle it and *keep coming back for more.*

Aren't these the kind of bearings you want on *your* equipment?

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

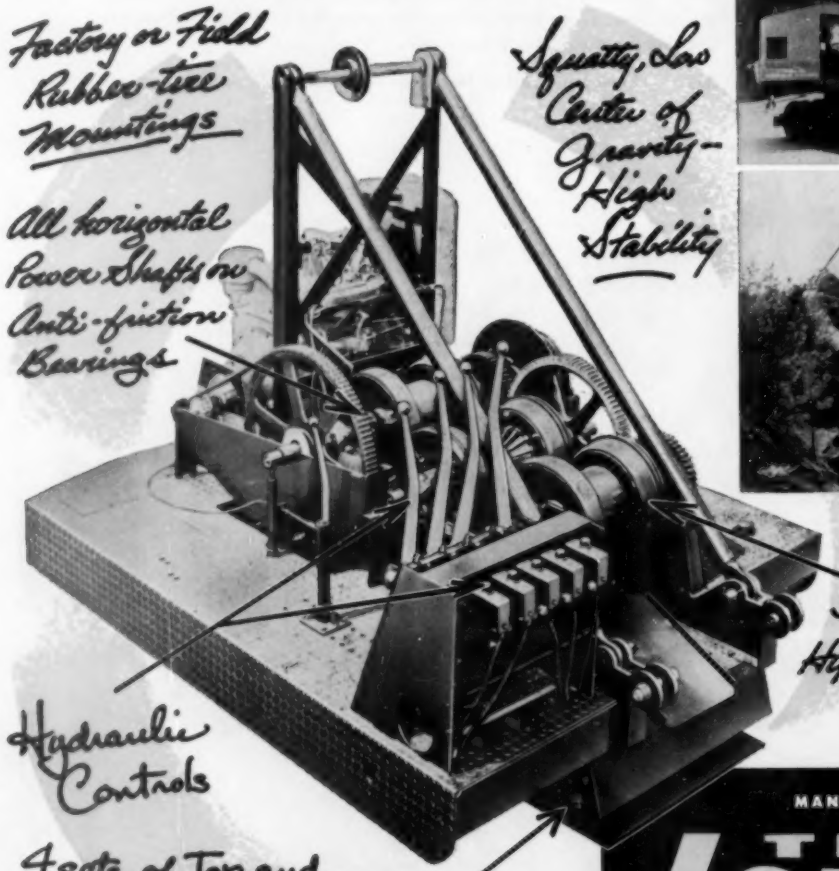
. . . for more details circle 208, page 16

THE NEW THEW LORAIN®

MODEL DIXIE

A NEW 3/8-YD. MODEL MADE, SOLD, SERVICED BY THEW-LORAIN

The acquisition of the 3/8-yd. "Dixie" model adds another go-getter to the Thew-Lorain line of products. Now manufactured by Thew, the "Lorain-Dixie" is competitively low-priced; doesn't have to back down on any comparison of quality. This proved 3/8-yd. machine now proudly carries the "Lorain" nameplate . . . is backed by all the handy parts stocks and service know-how of Thew-Lorain's entire nation-wide distributor organization. Get the facts today, because you'll be surprised at how much sheer quality and money-making performance you can get for so little money.


Factory or Field Rubber-tire Mountings
All horizontal Power Shafts on Anti-friction Bearings
Squatty, Low Center of Gravity—High Stability
5 interchangeable Hydraulic Clutches
Hydraulic Controls
4 sets of Top and Adjustable Bottom Hook Rollers

MANUFACTURED BY

THEW LORAIN®

THE THEW SHOVEL CO., LORAIN, OHIO, U. S. A.

. . . for more details circle 289, page 16

"Here's the plant that hits specifications easier and closer than any other plant we've ever operated . . ."

says **STREET BOYD**
of **STEINBERG-BOYD CONSTRUCTION CO.**
TULSA, OKLAHOMA

PAVING STONE		CLASS A	
OKLAHOMA SPECIFICATIONS	CEDARAPIDS PRODUCTION % PASSING	OKLAHOMA SPECIFICATIONS	CEDARAPIDS PRODUCTION % PASSING
100% passing 3"	100%	100% passing 1½"	100%
95-100% passing 2"	97.7%	90-100% passing 1"	95.9%
70-95% passing 1½"	85.1%	------passing ¾"	70.7%
50-85% passing 1"	61.7%	25-60% passing ½"	29.7%
-----passing ¾"	34.6%	-----passing ⅜"	12.4%
15-40% passing ½"	19%	0-5% passing No. 4	1.4%
-----passing ⅜"	10.6%		
0-2% passing No. 4	1.9%		

". . . and we're getting 180 to 250 TPH in Paving Stone, 140 to 160 TPH in Class A from our new Cedarapids Portable Crushing Plant."

You can hit specs right on the nose, too . . . outproduce any comparable plant . . . and do it at the low production costs that step up your profit. That's some of the reasons Steinberg-Boyd is so well satisfied with their new Cedarapids Unitized Portable Crushing Plant. It consists of a 2540 Portable Primary, an 1836 Twin Jaw Scalping Unit and the brand new Cedarapids Model 30C Secondary Plant featuring the Symons Cone Crusher. It's a plant designed to meet the big output and exacting gradation demands of modern turnpikes and toll roads.

Best of all, this set-up has all the features that *make money for you* on every job.

THESE EXCLUSIVE CEDARAPIDS FEATURES ASSURE BETTER GRADATION BIGGER PRODUCTION LOWER OPERATING COSTS

1. VIBRATING GRIZZLY
. . . by-passes most of the undersized material and fines. Increases primary output up to 25%.

2. TWIN JAW CRUSHER
. . . increases primary crushing production up to 40% over single jaw units and is especially efficient in abrasive rock or gravel.

3. HORIZONTAL VIBRATING SCREEN
. . . steps up screening capacity because the horizontal position of the screen cloth gives 12½% more screening area than an inclined screen of the same length.

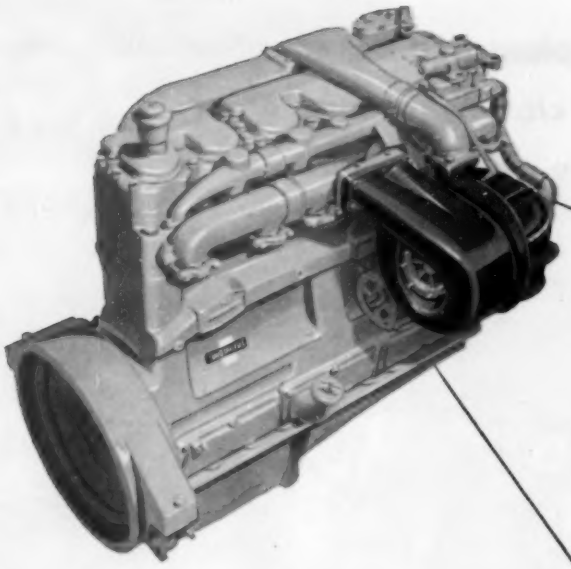
4. SYMONS® CONE CRUSHER
. . . produces high tonnages of uniform, fine-crushed aggregate, even in the hardest or most abrasive rock or gravel. The Symons Cone Crusher, built by Nordberg, and world famous for big-volume, low-cost operation, has been combined with Cedarapids mobility and quality construction to give you a portable plant with the high-profit features of a permanent installation.

Cedarapids Built by IOWA

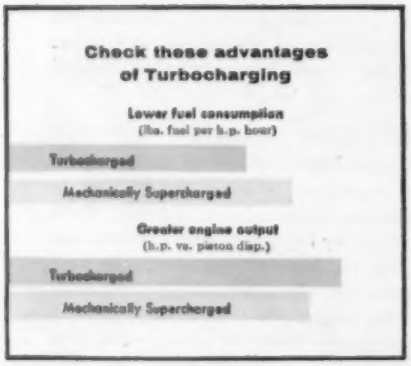
IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

. . . for more details circle 279, page 16



Cummins Turbodiesels •

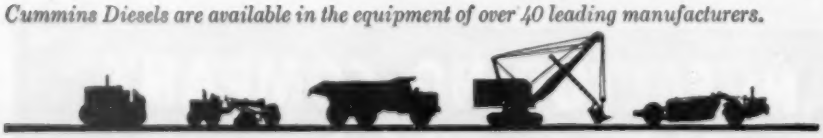


Five new Cummins Turbodiesels (175 . . . 250 . . . 262 . . . 300 . . . and 600 h.p.) now feature the sensational new development—exhaust gas turbocharging of high-speed diesels.

They give you more economy . . . better performance than naturally aspirated or mechanically supercharged engines. Exhaust gas energy normally wasted is harnessed to achieve a more perfect air-fuel mixture in the combustion chamber, without any parasitic load. (See diagram at right.)

If you want reduced fuel costs . . . longer engine life . . . lowest possible weight per horsepower . . . and maximum profits . . . get full details on Cummins Turbodiesels from your nearest Cummins Distributor.

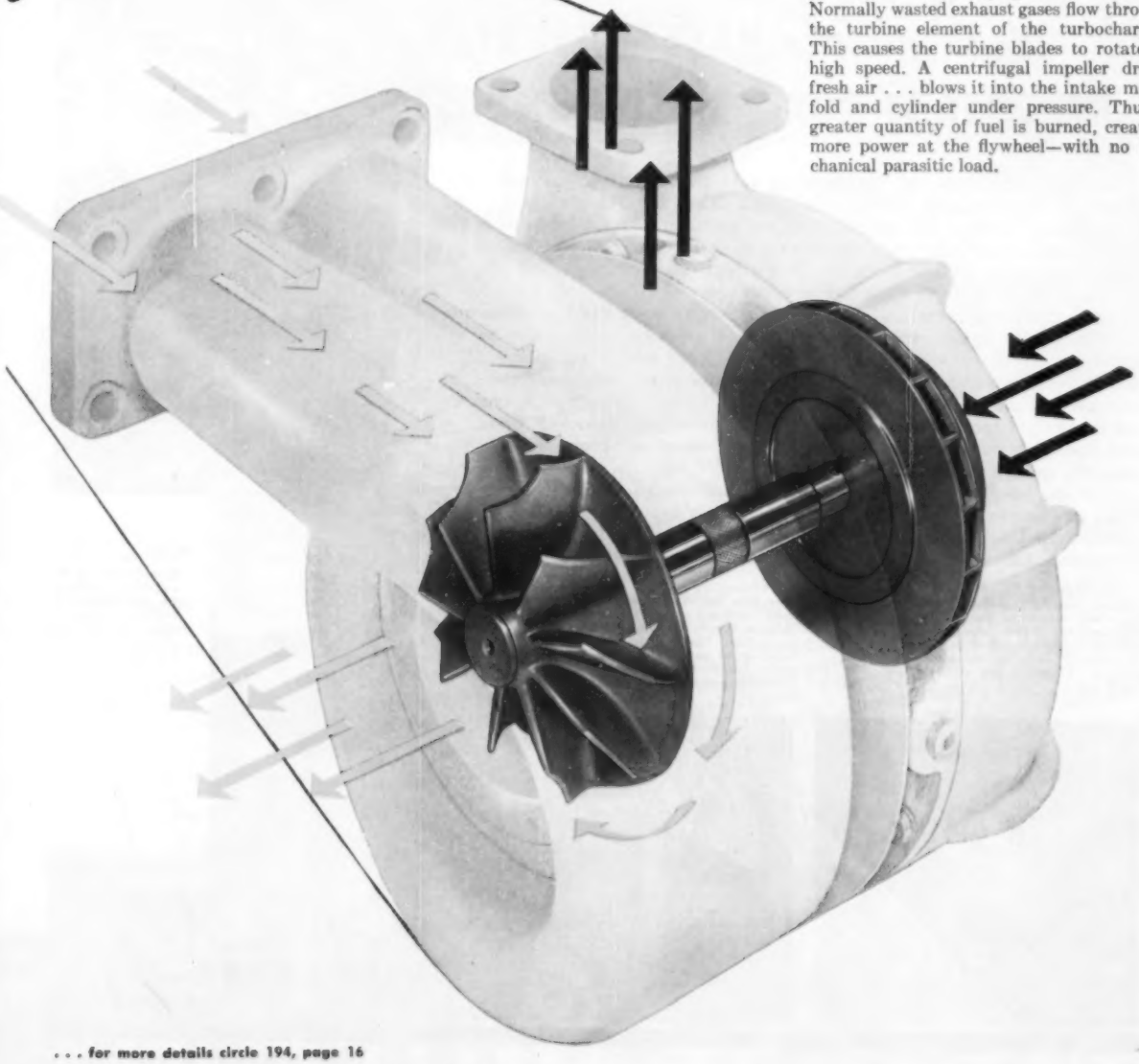
Cummins Diesels are available in the equipment of over 40 leading manufacturers.



CUMMINS

Cummins Engine Company, Inc. • Columbus, Indiana

. . put waste heat to work!



Cummins Turbocharging — how it works. Normally wasted exhaust gases flow through the turbine element of the turbocharger. This causes the turbine blades to rotate at high speed. A centrifugal impeller draws fresh air . . . blows it into the intake manifold and cylinder under pressure. Thus a greater quantity of fuel is burned, creating more power at the flywheel—with no mechanical parasitic load.

. . . for more details circle 194, page 16

The *JACKSON* MULTIPLE VIBRATORY COMPACTOR

Used on the VAST MAJORITY *of . . .* IMPORTANT ROAD-BUILDING JOBS!

On all of the new toll roads and on dozens of other highway and airport building projects JACKSON MULTIPLE COMPACTORS are the predominant medium for consolidating the granular soil sub-bases and the base courses of sand, gravel, rock or slag in waterbound and penetration macadam construction. They're also very extensively and successfully used on large area fills of various other types.

The popularity of this equipment has grown by leaps and bounds as one contractor after another discovered that with it specified densities can be achieved with greater uniformity, more economically and in less than one-half the time required with equipment of other types. Moreover, the Jackson Multiple will get into places larger equipment cannot reach, and for the really tight spots, individual compacting units may be detached, fitted with operating handles and operated like a standard, self-propelled manually guided compactor.

If you have any job requiring granular soil compaction, it will pay you to know specifically what Jackson Vibratory Compactors will do. See them at your nearby Jackson Distributor. Literature and Distributor's name on request.

Jackson manually-guided, self-propelled vibratory compactors deliver 4200 2-TON blows per minute. Achieve specified density of granular soils in layers as thick as 10" at the rate of 1800 sq. ft. per hr.

One man can readily operate a twin hook-up of Jackson Compactors, thereby virtually doubling production. Current is usually supplied by power plant on auto trailer (single or twin unit) with hydraulic pick-up of Compactor.

As indicated by the adjacent photos, the JACKSON MULTIPLE is readily adaptable to widening projects of any width.

JACKSON VIBRATORS, Inc.
LUDINGTON, MICHIGAN

. . . for more details circle 230, page 16

IF IT'S A REAL ROCK Shovel-

Any digging is EASY!

● When you have the power for the tough digging you can be sure of greater output in the easy jobs. If it's a real Rock Shovel any digging is easy!

Maybe your immediate problem is loading sand. Maybe you think that's always going to be your problem—loading sand, and you think you can get by with a lighter, less rugged machine.

Remember this! Northwest utilizes force most other independent crowd shovels waste. Watch a Northwest at work. With the Northwest Dual Independent Crowd the Northwest cuts through the bank smoothly without stuttering, without the restarts that delay other rigs. Uniform Pressure Swing Clutches are smooth in action and eliminate the jerks and grabs of ordinary clutch designs, assuring accurate spotting without waste of time or excess spillage. The "Feather-Touch" Clutch Control gives the *feel of the load* and simple mechanical design eliminates the complications of pumps, compressors, valves and tubing. Simplicity of design results in ease of upkeep and reduced down time and combines with other Northwest advantages to give high output that pays out profitably whether your digging is tough or easy.

NORTHWEST ENGINEERING COMPANY
1504 Field Building • 135 South La Salle Street • Chicago 3, Illinois

SHOVELS
CRANES
DRAGLINES
PULLSHOVELS

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

YOU CAN'T HAVE
NORTHWEST ADVANTAGES
UNLESS YOU OWN A NORTHWEST

A PICTURE REPORT OF

INTERNATIONAL POWER *in action!*

Boosting job production everywhere

13 TD-24's for Nello Teer—Most of the tractor work on their 4.98-mile, 3,065,000-yd. $4,306,000 section of the Massachusetts Turnpike is being done by these 161 dhp crawlers. Four with scrapers combine to average 327 twenty-yard loads daily on 1500 ft one-way hauls. Others tow rippers, push-load scrapers, or clean up around Teer's two 2½ and 4-yd shovels and 10 haulers.

"1/3 more overburden daily than competitive crawlers" . . . that's the report from Merkli Brothers Coal Company, Beaver, West Virginia, on their International TD-24. Unit is stripping 40 feet of sandstone and shale to uncover a 12 to 51-inch coal seam. "It has better balance and visibility than other tractors," says Partner Henry L. Merkli. "It costs less to maintain; takes less time to grease, too."

Crushes gypsum—Near Avenal, Calif., Superior Gypsum Company's International-powered crusher produces 300 tons of gypsum per 8-hr. day. Material is used to neutralize high-alkali irrigation water.

1 more trip hourly—Fast loading and acceleration help 18½-yd. Payscraper make one more trip hourly than other self-propelled scrapers used by W. E. O'Neill Construction Company, Gary, on their 2½-mile, 700,000-yard Indiana Turnpike section near Gary. Cycle length averages 2½ miles; material is mostly sand.

80 ft ditch in 3 hours—Excavating for water main in Henderson, Texas, International "300" wheel tractor dug 100 cu yds of clay hourly. Backfilling was handled by rig's front-end loader. Ditch is 4 ft deep, 22 in. wide.

"We saved 100 man-hours by lifting zonolite roofing slabs with our International-Drott TD-6," reports M. G. Aldrich, Macon, Georgia, on the 13,000 sq ft building job shown. Lifts of 1 ton were made to 10 ft eave height.

Rugged in rugged rock—"TD-6 is ideal for opening underground mines," says Malcolm McDonald of Kiabob Uranium Corp, Green River, Utah, "It gets around fast in narrow tunnels, yet brings out big loads."

International Industrial Power

INTERNATIONAL HARVESTER

A machine size for every job . . . see your nearest INTERNATIONAL DISTRIBUTOR for details.

PAYSCRAPERS
13 yds. and 18½ yds.

WHEEL TRACTORS
6 Models . . . . 9 to 59 dbp

CRAWLER TRACTORS
8 Models . . . . 40 to 200 hp

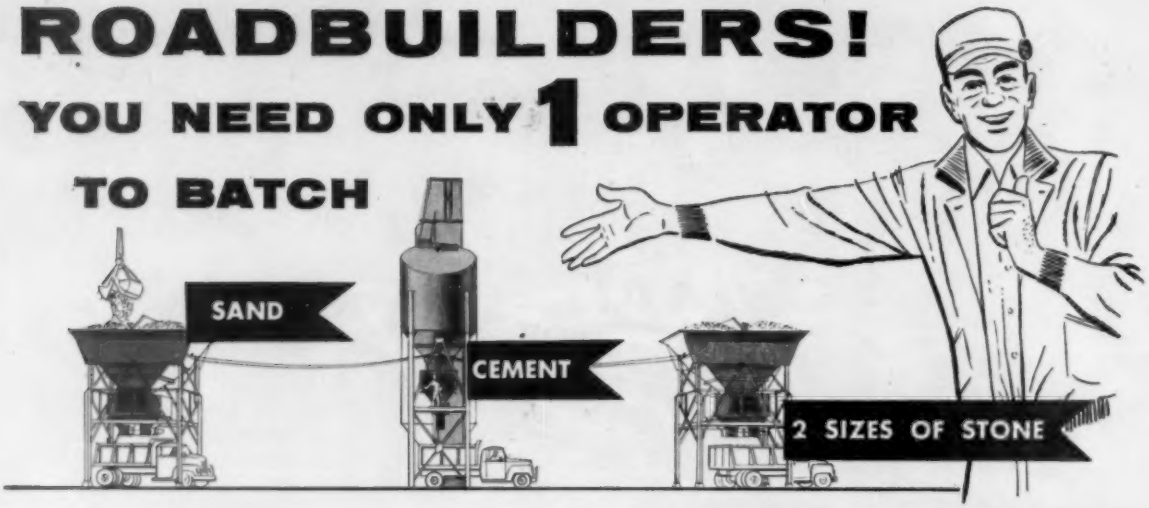
DIESEL, GAS ENGINES
18 Models. 16½ to 200 hp

ALSO: International Drott Skid-Shovels . . . International Scrapers, Bottom-Dump Wagons . . . and International Superior Pipe-Boom Tractors.

. . . for more details circle 281, page 16

ROADBUILDERS!

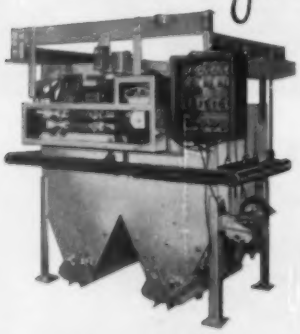
YOU NEED ONLY 1 OPERATOR TO BATCH



Automatically, Simultaneously... with the new

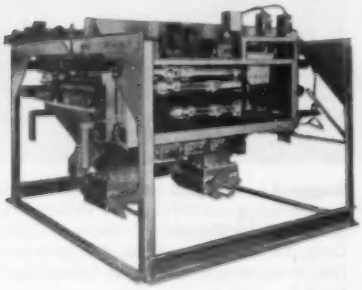
BUTLER 0-1-0

Road Builders Plant



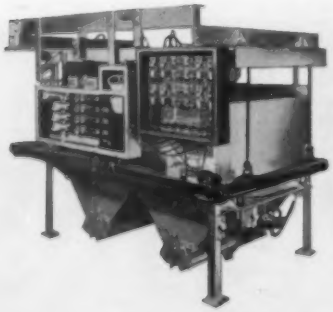
SAND

Two batches are discharged simultaneously. Electrical controls permit operation either by man at cement batcher, by the truck driver or, if required, by operator stationed on the sand batching plant.



CEMENT

Here one man may operate all 3 units or the cement batcher alone. Hoppers are quickly and accurately charged by ingenious combination of rotary gate (for speed) and vane feeder (for final accuracy).



STONE

Two batches, each comprised of 2 sizes of stone are discharged into the truck in the same instant. Cross feeds from each battery of hoppers to batchers provide correct proportion of each size of stone in each batch.

Electrically operated controls are centralized at the cement batcher so that one man operates any one, two or all three plants simultaneously — and at the touch of a finger. That's performance that easily keeps pace with two 34E pavers.

Relays on each plant are pre-set for the specified batch proportions and continue those cycles unless at some point the engineer requires a change. New proportioning is then quickly and easily established.

So versatile,* however, is the BUTLER 0-1-0 that, if the contractor prefers, the truck driver himself can actuate either the sand or stone batchers without leaving the truck cab.

Important for quick set-up time are the special electrical connectors between the batchers. Interconnection is as simple as plugging in your toaster.

In the 0-1-0 BUTLER has provided new and more profitable horizons for the contractor in automatic operation at higher production levels. And for the supervising engineer the 0-1-0 attains perfect and constant foolproof accuracy.

Please write for the complete story about the 0-1-0.

**Should local regulations require, each batcher may be controlled by its own operator.*

BUTLER BIN CO.

959 Blackstone Avenue
Waukesha • Wisconsin

. . . for more details circle 183, page 16

One Man Drives 1600 Form Pins a Day!

Again Le Roi Tractair's portable air-power helps get more done—at less cost

When you're driving form pins at the rate of 200 an hour, you're saving money. And that's exactly what the Tractair unit is designed to do. Here's how:

Tractair is a combination 42-hp wheel tractor and 125 cfm compressor. This means it is extremely mobile—takes air-power almost anywhere you need it. It can do a lot of things for you — drill rock, tamp fill, break concrete, vibrate concrete. It can be fitted with attachments, too, so that you can load, backfill, sweep, and plow.

Yes, the Tractair unit can do 101 odd jobs for you, save you money on all of them, and you don't have to tie up trucks or men to use it. So write for our latest literature and find out how the versatility of Le Roi Tractair can help you cut costs on a wide variety of jobs.

T-35

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

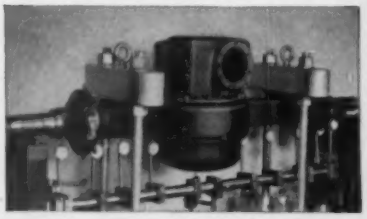
PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

NATION-WIDE SALES-SERVICE NETWORK

ALABAMA: Birmingham — ARIZONA: Phoenix — ARKANSAS: Harrison, Little Rock — CALIFORNIA: Bakersfield, Berkeley, Fresno, Los Angeles, Redding, San Francisco — COLORADO: Denver, Grand Junction — CONNECTICUT: Hartford — DELAWARE: Dover — FLORIDA: Jacksonville, Miami, Tampa — GEORGIA: Atlanta, Augusta — IDAHO: Boise, Idaho Falls, Sioux Falls, Twin Falls, Wallace — ILLINOIS: Chicago — INDIANA: Indianapolis, South Bend — IOWA: Cedar Rapids, Des Moines, Sioux City, Waterloo — KANSAS: Kansas City, Wichita — KENTUCKY: Lexington, Louisville, Madisonville — LOUISIANA: New Orleans, Shreveport — MAINE: Augusta — MARYLAND: Baltimore, Hyattsville—MASSACHUSETTS: Hyde Park, Worcester—MICHIGAN: Detroit, Grand Rapids — MINNESOTA: Duluth, Minneapolis — MISSISSIPPI: Jackson — MISSOURI: Joplin, St. Louis, Springfield — MONTANA: Billings, Great Falls — NEBRASKA: Lexington, Lincoln, Omaha — NEVADA: Reno — NEW HAMPSHIRE: Manchester — NEW JERSEY: Cranford, Kingston — NEW MEXICO: Albuquerque — NEW YORK: Albany, Binghamton, Buffalo, Massena, Rochester, Saugerties, Syracuse, Whitesboro, Woodside (L. I.) — NORTH CAROLINA: Charlotte — NORTH DAKOTA: Grand Forks — OHIO: Cincinnati, Cleveland, Columbus, Dayton, Toledo — OKLAHOMA: Oklahoma City, Tulsa—OREGON: Portland—PENNSYLVANIA: Harrisburg, Philadelphia, Pittsburgh, Wilkes Barre — RHODE ISLAND: E. Providence — SOUTH CAROLINA: Columbia — SOUTH DAKOTA: Sioux Falls — TENNESSEE: Chattanooga, Knoxville, Memphis, Nashville — TEXAS: Beaumont, Dallas, El Paso, Houston, Lubbock, Midland, San Antonio — UTAH: Salt Lake City—VIRGINIA: Richmond, Roanoke — WASHINGTON: Seattle, Spokane — WEST VIRGINIA: Clarksburg, South Charleston — WISCONSIN: Green Bay, Milwaukee — WYOMING: Casper.

. . . for more details circle 236, page 16

Matched to your toughest conditions. Steep grades! Heavy loads! Muddy going! Every adverse condition is duplicated in our "Torture Chamber" to produce axles that can "take it". Stock axles are picked at random and subjected to the equivalent of a "chuckhole" shock every 4 seconds, 24 hours a day, for months on end. Another test simulates an uphill pull 3,000 miles long. Only tests as rugged could produce axles so tough.



GREATEST ADVANCE SINCE

exclusive double-reduction design 2-speed gear ratio spread!

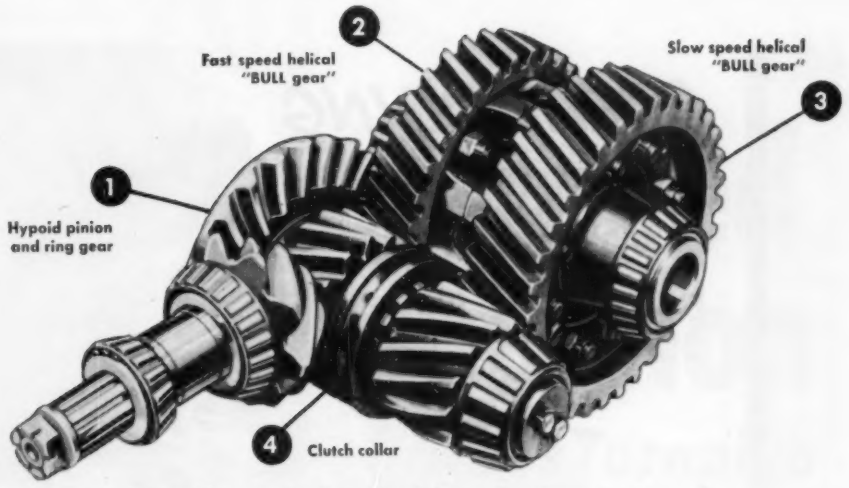
Tailor-made power exactly to your trucking needs with Timken-Detroit!

Unequalled flexibility! TDA 2-Speed Axles, give an almost *unlimited* choice of gear ratios. The Timken-Detroit design is so simple and basic, that an ordinary mechanical change lets you tailor power exactly to your trucking needs. Where other 2-speed axles limit you to only a single gear spread of 37%, TDA offers a range all the way from 28% to 49%.

TDA meets varied needs! The variety of hauling conditions that today's trucks must meet call for maximum speed and power flexibility. Other 2-speed axles are just too limited to meet this need. On the other hand, TDA's simple double reduction design gives complete flexibility. Gear ratio can be easily changed without weakening the axle unit in any way.

How you benefit! TDA not only gives you a much wider power range, but also, all the advantages of a stronger, sturdier, smoother operating design. Since helical "Bull" gear sets operate independent of one another, there is no overheating even after indefinite running in low speed. Bigger huskier TDA parts last longer, stand up better under tough usage.

Less down-time, longer axle life, fewer repairs, higher fuel economy, lower operating costs and higher profits. These are some of the important reasons why so many leading manufacturers and operators everywhere specify Timken-Detroit 2-Speed Axles.



How the exclusive double-reduction design of

TDA 2-SPEED AXLES

gives you greater speed, endurance, and economy!

This is HOW TDA's 2-Speed principle works! A husky hypoid ring gear and a bigger, stronger pinion set (No. 1 in illustration above) provide the *first step* of the total gear reduction for both fast and slow ratios. Two large, heavy-duty helical gear sets provide the *second step*. Both sets are of balanced size and capacity. One set (No. 2 in illustration) is for fast speed; the other (No. 3) is for slow speed. The clutch collar (No. 4) moves to right or left to engage one helical pinion or the other.

WHY this principle offers far wider spread! Because the TDA design is so simple, the ratio may be changed merely by changing the low speed helical gear pinion. Unlike ordinary designs which are limited to 37%, TDA offers spreads of 28%, 37%, and 49%. In effect, this flexibility gives you your choice of power ratios to exactly match your needs.

Greater endurance, longer truck life with TDA. TDA's simple design eliminates small complicated parts and midget size gears. Large hypoid helical design gives more teeth in contact – quieter operation and far less strain. Bearings are larger, too. Helical "Bull Gears" not in use idle, further reducing wear. All this adds up to longer engine life... and more efficient and profitable operation under all conditions.

THE FIRST 2-SPEED AXLE

gives TDA world's widest

TIMKEN Detroit AXLES

TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

The Accepted Standard — TRADE MARK REGISTERED

World's Largest Manufacturers of Axles for Trucks, Buses and Trailers

Plants at: Detroit, Michigan • Oshkosh, Wisconsin • Utica, New York • Ashtabula, Kenton and Newark, Ohio New Castle, Pennsylvania

. . . for more details circle 267, page 16

Increase axle life with GENUINE TDA EQUIPMENT PARTS

Take no chances with ordinary replacement parts. For sure, dependable factory-type jobs, specify genuine Timken-Detroit axle parts kits—identical to your axles' original equipment.

Each kit is complete — gives you everything you need in one handy package. Gaskets and shim parts, brake liners, steering knuckles, differential gears — for every size of brake and axle. Order by number from your dealer. Cut labor and adjustment costs. Get trucks back on the road quicker.

GREAT GOING

. . . with rugged White power engineered right to the job!

WHEN the going's rough and the payload heavy—then is the time you're thankful for a White Six-Wheeler!

In rugged ready-mix service, for example, Whites set the performance standard because of their quality—with sturdy, double channel heat-treated alloy steel frames . . . powerful Mustang Engines . . . heavy-duty axles.

Great going! Yes, because you can carry more payload, do more work, with Whites.

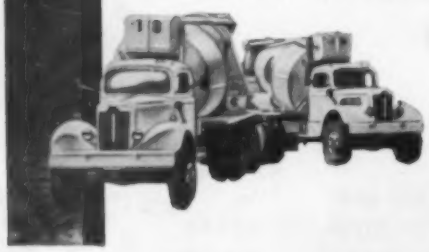
It's the same, no matter what your business, because Whites are engineered *right* to *your* job.

Get the whole story of White Quality from your White Representative without delay.

THE WHITE MOTOR COMPANY • ***Cleveland 1, Ohio***

THE WHITE MOTOR COMPANY OF CANADA LIMITED • TORONTO

White



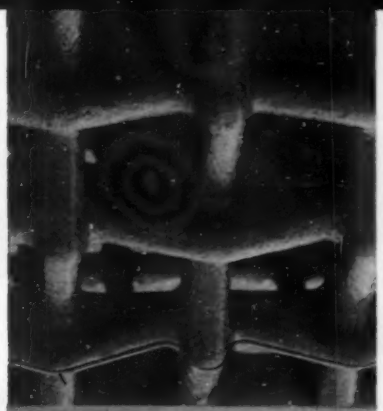
CONCRETE MATERIALS, INC., Charlotte, N. C., have a fleet of White WC-2264 Six-Wheelers in their service, with 5½ cu. yd. transit mixers, used as 6½ yd. agitators, for total payload of 26,000 lbs. R. O. Evans, manager, says, "Auxiliary transmission with both over and under drive is of great benefit. Gasoline mileage excellent. White frames and springs are outstanding. We are proud of our Whites!"

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

. . . for more details circle 274, page 16

high speed compaction

on the Kansas Turnpike



This highly efficient "Grid" compacts out to the top at high speeds.

HYSTER® GRID* ROLLER compacts fills 3 times faster

Specifications:

Section B of Contract 3-10-E-(1) on the Kansas Turnpike included a 29 ft. high structural approach. Specifications were 90% and 95% Standard Proctor with 100% Standard Proctor on the last 200 ft. from the structure. Material was clay, highly plastic, classified A-7-6.

Results:

Towed by a Cat DW15 Tractor, a Hyster "Grid" roller compacted fill material **at an average speed of 11 MPH.** Only 8 to 10 passes were required to get required densities on 8″ lifts.

The "Grid" roller working at high speeds obtained 94 to 95% densities on the 90% areas, and 100 to 108% densities in the 100% areas.

See how the "Grid" roller speeds up compaction on your jobs. Call your Caterpillar-Hyster Dealer or write Hyster Company, 2995 N.E. Clackamas Street, Portland 8, Oregon, or 1895 N. Adams Street, Peoria 1, Ill.

HYSTER COMPANY

"Matched Design" Equipment for the Construction Industry

HYSTER

*Grid is the registered trademark of the Hyster open-surfaced roller. Cat and Caterpillar are registered trademarks of the Caterpillar Tractor Co.

. . . for more details circle 217, page 16

SPEEDS MOWING—For fast, clean roadside mowing, try a Ford Tractor and Rotary Cutter. Ideal, too, for golf-course rough, park areas, cemeteries and institution grounds.

CUTS EXCAVATING COSTS—Ford Tractor and hydraulic backhoe is widely used for water, gas, sewer and street department work. Used by smaller cities for sanitary landfill garbage disposal.

DIGS TRENCHES FOR LESS—Ford Tractor and trencher digs up to 800 lineal ft. per hour. Saves time and labor on street construction, utility-service connections, sewer and drainage systems.

MAKES STREET CLEANING EASY—Ford Tractor and broom keeps streets, gutters, sidewalks and parking areas clear of trash and dirt in the summer; leaves and snow in the winter.

From mowing to maintenance

FORD TRACTOR POWER SAVES TAX DOLLARS!

Ford TRACTORS

TRACTOR AND IMPLEMENT DIVISION
FORD MOTOR COMPANY
Birmingham, Michigan

More and more economy-minded Federal, State and Local governmental agencies are stretching tax dollars by replacing manual labor with efficient Ford Tractor power. That's because Ford Tractors get more work done at lower cost—handle a wide variety of jobs throughout the year.

You'll find Ford Tractors and Equipment used to save money on highway and park mowing . . . excavating and trenching . . . materials handling . . . snow removal . . . road and street maintenance. One big advantage is that a single Ford Tractor can handle *all* these jobs—stay busy every day in the year. Contrast this with expensive special-purpose equipment that works during one season, then sits idle the rest of the year!

Have a talk with your nearby Ford Tractor and Equipment Dealer today. He'll explain how Ford Tractor power can handle many of your jobs more economically. Ask him for comprehensive literature or write to the Tractor and Implement Division, Ford Motor Company, Birmingham, Michigan.

. . . for more details circle 202, page 16

GET ON THE ROAD TO HIGHER PROFITS WITH GALION DUO-SCOPIC HOISTS

haul more . . . earn more . . . with every load

Model 66381 outrigger mounted Duo-scopic hoist with Model 12N-5 body. Hoist capacity up to 22 tons.

Start earning extra profits with Duo-scopics right away. Phone or see your Galion distributor today.

Galion Duo-scopic hoists, mounted on trucks with high-capacity front axles, offer a solution to the problem of profitable operation under conditions imposed by today's axle weight limit laws.

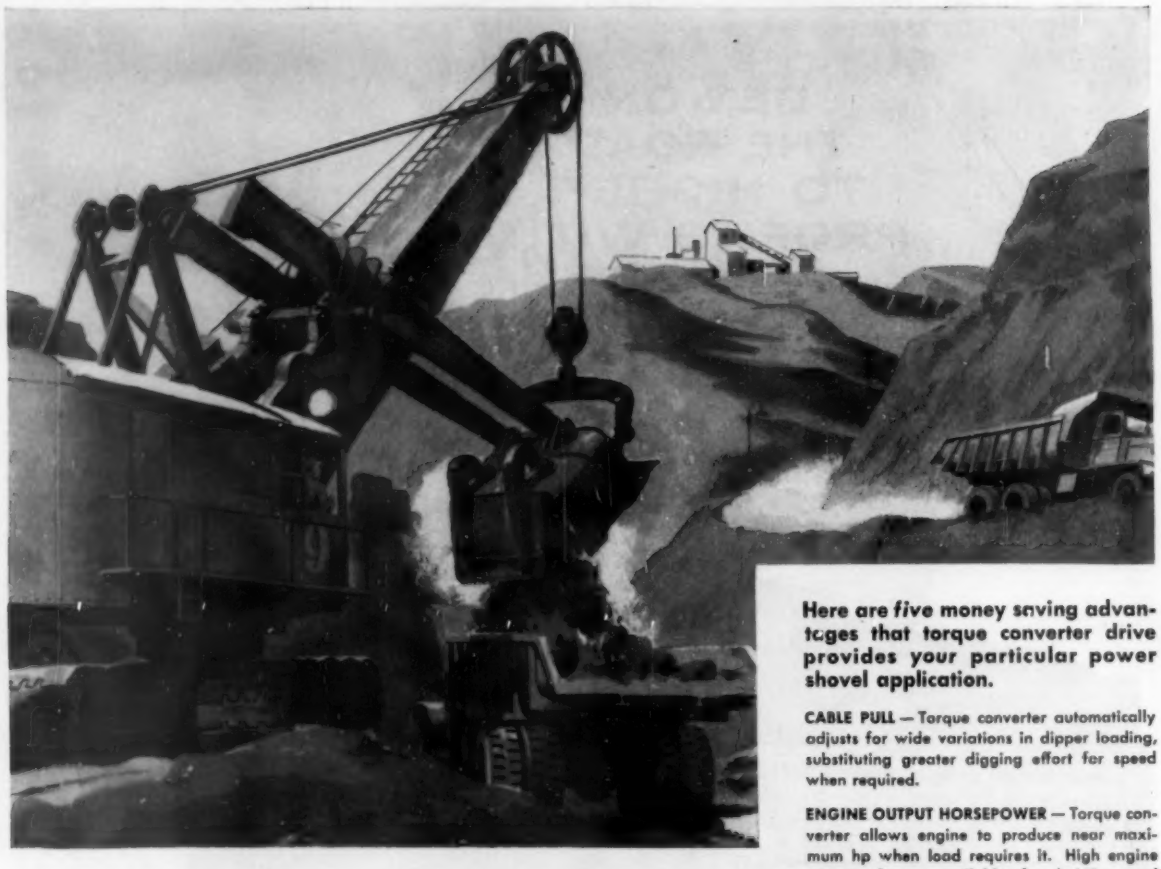
Duo-scopics are engineered to eliminate unnecessary dead weight and to relocate a greater portion of hoist, body and load weight forward off the rear axles. Teamed with Galion's weight-saving contractor's bodies, they can carry as much as 1,500 lbs. more payload than conventional hoists and bodies.

And, every Galion Allsteel hoist is twice-tested before shipment to protect you against costly down-time.

AA-834

THE DUO-SCOPIC GALION ALLSTEEL BODY COMPANY · GALION, OHIO

. . . for more details circle 204, page 16



$750 SAVED IN ONE SEASON

using Torque converter on power shovel

A prominent contractor recently reported that he saved $750 in one season using a Twin Disc *Three-Stage* Torque Converter on one of his power shovels.

This total was comprised of savings on three different phases of the shovel's application. (1) Cable—on two shovels with direct drive, cables were replaced *seven times* on one and *eight times* on the other. With torque converter drive, however, the cable was replaced *only three times*. Resultant saving: $350. (2) Maintenance costs — a saving of 12½ cents per hour, or a season total of $250 on the shovel with the Twin Disc Converter. (3) Fuel consumption — the torque converter unit used ½ gallon less fuel per hour, saving $140 in the 2,000 hour season.

You can realize a *similar* saving from *your* power shovels. *Specify* Twin Disc Torque Converters for your new units or *install* them in your existing equipment. For full details see your equipment or engine distributor. Write for bulletin 135-D.

All facts in the above story are contained in an actual case history. We have not identified the operation because publishing the owner's name would reveal confidential information.

Here are *five* money saving advantages that torque converter drive provides *your* particular power shovel application.

CABLE PULL — Torque converter automatically adjusts for wide variations in dipper loading, substituting greater digging effort for speed when required.

ENGINE OUTPUT HORSEPOWER — Torque converter allows engine to produce near maximum hp when load requires it. High engine power **always** available for hoisting and crowding.

ENGINE SPEED — Torque converter provides high engine speed throughout its working range, and higher hp output is available for heavy digging and hoisting loads. Converter equipped engine can't lug. Heavy overloads will not kill the engine.

LOWER MAINTENANCE COST—Torque converter reduces peak loads throughout shovel drive train. Cushioning shocks increases wear life for most parts subject to fatigue failure.

LONGER CABLE LIFE — In proved installations, even frayed cables with short life expectancy have been known to last a year or more where a torque converter has provided smooth, sustained output power.

TWIN DISC

TWIN DISC
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES OR SALES ENGINEERING OFFICES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • TULSA

. . . for more details circle 269, page 16

B.F.Goodrich

All-Nylon tires recapped again and again, cut costs one-half, contractor reports

S. J. GROVES AND SONS CO., builds roads all over North and South America. Equipment used by this Minneapolis, Minn., contractor includes tractor graders and scrapers, oil and sprinkler trucks, low-boys and trailers, dump trucks and compactors.

To keep tire costs at a minimum, this company uses B. F. Goodrich *all-nylon* tires. On the Indiana Turnpike, the project engineer reports: an average life of over 4,000 hours, sometimes as many as 5 recaps. No wonder Groves finds B. F. Goodrich tires cut costs one-half!

Nylon can lower your tire costs, too

Nylon is stronger than ordinary cord materials. It withstands double the impact, resists heat blowouts and flex breaks. That's why the B. F. Goodrich *all-nylon* tire body outwears even its extra-thick tread, *can be recapped again and again!* You get more original hours of service, more hours of service per recap. You save money on tires!

B. F. Goodrich makes a complete line of *all-nylon* tires for every off-the-road job. See your B. F. Goodrich retailer today and find out how you can cut tire costs to a minimum. His address is listed under Tires in the Yellow Pages of your phone book. Or write *The B. F. Goodrich Co., Tire & Equipment Division, Akron 18, Ohio.*

THESE RECAPPED B. F. Goodrich *all-nylon* Rock Logger tires (rear) work 20 hours a day, 6 days a week the year 'round.

. . . for more details circle 210, page 16

S. J. GROVES uses 7 kinds of B. F. Goodrich tires on the Indiana Turnpike project, including the Super Traction tires shown above.

Specify B. F. Goodrich tires when ordering new equipment

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

THE NEW D7, D8 and D9

here's what they can mean on your job

The new 286-HP CAT* D9 Tractor

Choice of torque converter or oil clutch drive. First track-type tractor with Turbocharger. Completely new 286-HP engine. "Live-shaft" drive for rear-mounted equipment. Many other important features.

The new 191-HP D8

With torque converter (Series D). With exclusive oil clutch drive (Series E). Completely new 191-HP engine. "Live-shaft" drive for rear-mounted equipment independent of flywheel clutch. New easy-working controls. Many other improvements.

The new 128-HP D7 Series C

Gear-type balancer gives six-cylinder smoothness. New 128-HP engine. Drawbar pull now 28,700 lb. maximum. New starting engine for simpler, easier operation. Track shoes hardened by "water quench" process. And many other important advances.

The year's biggest news on tracks: Caterpillar's three great new Diesel Tractors.

They're big news because they give you greater power and better performance than ever before.

The D9 and D8, for example, give you your choice of torque converter or exclusive oil clutch drive so you can best match your machine to your own job requirements.

All three give you features like one-piece frame-steering clutch case assemblies, and track shoes specially hardened by a new "water quench" process which means longer shoe life.

All three are easier to operate, with simpler, more powerful starting engines, easier working controls and other improvements.

They're easier to service, too; an exclusive trouble-free oil clutch, separately removable power train components and a fuel system that needs no adjustments in the field are only three of many reasons why.

Better be sure you get *all* the news about the new D7, D8 and D9. Call your Caterpillar Dealer today. Or mail the coupon below.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

MAIL TODAY!

CATERPILLAR TRACTOR CO., Peoria, Illinois, U.S.A.

I'd like *all* the big news about the new D7, D8 and D9.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

THE NEW D9, D8 AND D7 —EXAMPLES OF CATERPILLAR LEADERSHIP IN ACTION

. . . for more details circle 186, page 16

Three Mixers Abreast . . . PROCESS

RECORD CEMENT-TREATED BASE JOB

How 469,000 square yards of treated base was placed on California freeway project at rate of 16,000 to 17,000 square yards daily. Freeway project here described illustrates methods evolved in California in past 16 years in placing over 30 million square yards of cement treatments on state highways.

Roads and Streets Staff Report

IN California the design and construction of cement-treated base and cement-treated subgrade, its cousin, have been developed into a highly standardized routine. Today, 20 years after soil-cement was first brought out of cement industry laboratories as a new road type, California is the leading user of this construction.

With this preamble, let us review a current project which is the largest in cement-treated base yardage ever

● Three Pettibone Wood Roadmixers working windrows totaling 23.26 cu. ft.

● The mixer train, as seen from the outer shoulder. Note booster tanks, and in center row a transport tank, straddling the freshly processed mix.

included in a single contract by the California Division of Highways, or probably any other state. The job is a 13.1-mile section of dual highway between Sacramento and Roseville, being constructed as a full freeway with no stop lights and with all cross traffic carried on separate levels, in the progressive modernization of California U.S. 40. Grading and bridges were built under earlier contracts. The base and paving and related work were let in January, 1955, to Baldwin Contracting Company of Roseville, on low bid of about $1,800,000.

The 469,000 sq. yd. of cement-treated base, which is the principal concern of this report, represents 26.2 miles of main roadway and 7 miles of ramps and connectors at interchanges.

The main roadway has an untreated base layer 4 in. thick under the pavement and extending shoulder to shoulder; an 8 in. by 25 ft. cement-treated base; 3 in. of dense graded hot-mix asphaltic concrete 24 ft. wide, placed in two layers and topped with .04 ft. of open graded hot mix; and asphaltic plant mix shoulders. The treated base is California Class A with 4½ percent cement.

Cement-treated base for ramps consisted of 4 in. depth of Class B, similar to Class A but with 2 percent of cement.

A factor in this economic design was the availability of a good local

● The mixers, having completed single-lane ramp, are moving back to main line. Completed section of cement-treated base in background has been given emulsion curing seal.

● (Left): One of Miles & Son's Pettibone Wood cement tankers, depositing metered spread of portland cement on windrow. (Right): Crushed breccia aggregate for cement treatment being deposited on the completed subbase, using a GMC truck-trailer with 28-ton load and Pettibone Wood windrower. Note trimmed shoulder edge, required to confine the base spread.

● Final rolling of cement-treated base in progress, using a Tampo rubber-tired roller, two Huber 12-ton rollers, and sprinkler truck.

● Close-up of the new self-propelled Pettibone Wood Model 42 roadmixer in action.

aggregate, consisting of breccia or cemented volcanic material. Aggregate for both the untreated and the treated base came from the same crusher run of this material. Gradation was specified as follows:

Sieve Size	Percent Passing
2 in.	100
1½ in.	90-100
¾ in.	50-90
No. 20	25-50
No. 200	0-15

This gradation was adopted to utilize the somewhat coarser than average material and provide good gradation with sufficient fines for binding into a dense base. It represents a modification of the California standard for Class A cement-treated base material, which is for 1 in. maximum.

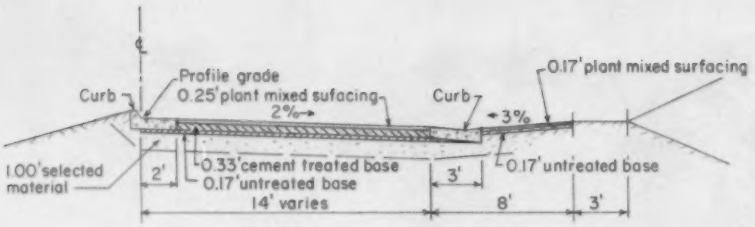
The aggregate plant was located near one end of the job. For economy of delivery of the huge base tonnages (some 400,000 tons of both courses), the contractor elected to use large haulers, principally 4-axle, dual-tired tractor-trailer combinations (GMC and other makes) carrying 25 to 28 tons per load. Also 3-axle trucks were used in hauling 20-ton loads, these being new White 10-tired units developed for this job.

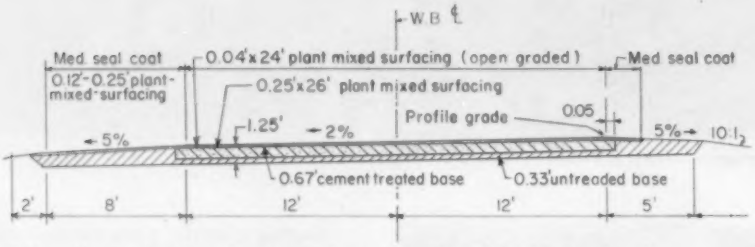
Hauling over the grade entailed no problem, but a completed 3-span bridge was an obstacle because of the over-limit axle loads. The problem was met by superimposing a temporary steel trestle on the deck; the trestle spans were supported at pier points, thus relieving the deck of live-load stress.

Both the untreated and the treated base were placed first on ramp roadways, to get this slow end of the job out of the way. Base widths here varied from 11 to 14 ft., and numerous wedge or flared sections had to be constructed, making it impracticable to use the traveling mixers in place. Pettibone Wood windrowed base material was mixed on sections of the main roadway, and mixed material picked up with an Adams loader, hauled, and placed on the ramps with spreader boxes.

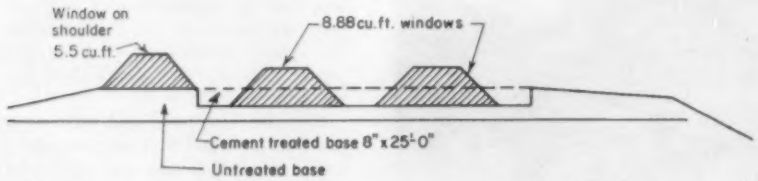
Then the base courses for the main line were constructed, going through on one side and back on the other.

● Construction trestle superimposed over completed freeway bridge — enabled Baldwin Contracting Company to haul loads up to 20 tons on three axle-trucks, and semi-trailer loads of 28 tons without exceeding legal limit.





● Two of several variants in cross-sections on the U.S. 40 California relocation.



● Showing the three treatment windrows, in relation to the subbase and cement-treated base.

Untreated Base Construction

Untreated base rock, which was required to have a minimum "R" value of 78, was deposited on the grade in measured windrows using calibrated spreader boxes, spread with blades and rolled with 12-ton 3-wheel steel rollers and a 13-ton 2-axle pneumatic-tired roller. Compaction was to a relative compaction of 95 in accordance with California standards.

The very dry crusher output kept two 2,500-gal. sprinklers busy. The rule was to bring moisture to about 18 percent in order to maintain 12 percent optimum under blading and rolling. Construction was paced closely to the speed of the mixers which followed on the treated course. Windrowing was kept about a mile, or a day's run, ahead.

The untreated base was checked against the blue tops by a "choker board" devised by the foreman for projecting the 2 percent lateral slope specified for top of base.

Miles & Son, Largest Specialist in Cement Stabilization

The equipment and personnel of Miles & Son, of Merced, California, have been employed for cement-treatment of the base on the Sacramento-Roseville project. Miles & Son are undoubtedly the world's largest operators as cement stabilization specialists. The firm expects to handle cement delivery and travel plant mixing for 2,000,000 sq. yd. of cement treatment on California highways in 1955, using five Pettibone Wood traveling mixers and three Pettibone Wood cement bulkers and jumping the equipment between fifteen projects.

Entry into this specialist relationship was a logical extension of Miles & Son's largest and long-established bulk cement hauling business. The company operates over 200 cement transports serving half a dozen large cement producers throughout California.

Cement-Treated Base

Shoulders alongside the cement treatment were first required to be built up, compacted and trimmed to accurate elevation at optimum moisture. California specifications require this, and also trimming shoulder edges to a neat line, so that the shoulder will serve as a template and "choker" for the blade operators, and confine the treated base in a trench.

Cement-treated base was mixed by equipment and personnel of Miles & Son of Merced, California, which company also transported and spread the cement.

Immediately ahead of the road mixers the Baldwin organization dumped windrowed material, again using calibrated boxes and carefully checking windrow dimensions to insure an accurate thickness of spread. Two windrows each containing 8.88 cu. ft. per running foot of loose material were placed on the roadway area, and a third windrow containing 5.5 cu. ft. was placed on the inner shoulder. This spacing, while occupying more than base width, was necessary to provide room for the mixers and tankers and insure definite separation between the oversize rows.

A Pettibone Wood bulk spreading tanker straddled the windrows, depositing 32 lb. of cement per foot for the larger rows and 20 lb. for the smaller to provide the specified 4½ percent cement ratio.

Processing of the large windrows was done by three Pettibone Wood Roadmixers. The mixers on the two larger windrows were the latest Model 54's which were tractor drawn and tractor powered by Caterpillar D8's. Chrysler engines mounted on the Roadmixers provided power for the hydraulic system and for the pump and water supply system.

The shoulder windrow or smaller windrow was mixed by a self-propelled Model 42 Pettibone Wood Roadmixer. These three mixers kept approximately abreast at all times so as to simplify the laydown which followed immediately. Miles and Sons purchased the newest Model 54 and a new Model 42 to supplement the Roadmixer which they previously owned for three or four years.

Although full-time operation was impossible, it was interesting to note that at one time when all machines were operating, a peak production of something over 1,500 tons per hour was obtained.

Water was added to each mixer by a 2,000-gal. towed tanker. A 4-in. pump fed the Model 54's and two 2½-in. pumps, the Model 42. Two booster trucks carrying 2,500 gal. on

1 Motor grader at left (Caterpillar 12) is taking initial bite in middle windrow, using tilted blade corner. Windrow at right already laid out. Second grader starting another blade pass, facing opposite direction.

2 Left grader has completed first "quartering" (scene 1), is backing up for next. Grader at right (blading opposite direction) is completing outer windrow spread. Rolling begun.

Step-By-Step: "Quarter Crowning" and Laying Out

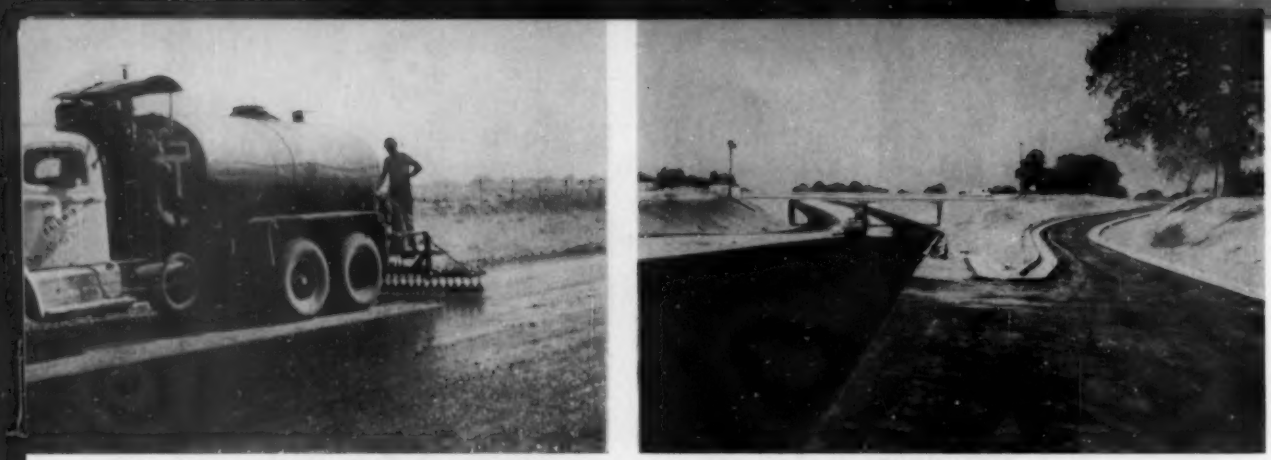
3 Several passes later. Middle windrow now nearly laid out and feathered with outer windrow on left. Windrow on shoulder (at left) still untouched.

4 Next, blade on left has made initial cut in shoulder windrow; spreading and rolling of other windrows continues.

Three Heavy Windrows for a Uniform Base Spread

5 Shoulder windrow material is being evenly distributed laterally clear across the two other windrows (working toward right of picture).

6 Laying-out job near completion. The three machines are about to move ahead to the next 500-ft. section.



● Applying emulsified asphalt curing cover, and glimpse of cure-covered cement-treated base for typical deceleration and ramp paving. Asphalt topping in place on main roadway.

10 tires average three trips per hour each to maintain mixer supply. The tankers were backed in carefully, straddling the freshly mixed windrows so as to leave no tire marks.

Windrows "Quarter Crowned"

The Baldwin organization adopted a special procedure for breaking down the oversize windrows and minimizing lateral movement and manipulation. It should be remembered that the 8-in. treated base, requiring 23.26 cu. ft. per running foot of material, loose dry measure, is exceptional under California specifications. Ordinarily, the maximum compacted depth permitted in a single layer is 0.58 ft. or about 6¾ in. The third windrow on the shoulder also added to the problem of laying out.

Taking a windrow length of 500 ft. or so, the first step was for two Cat 12 motor graders to move in, one facing forward toward the mixers and one backward. Making two passes and backing between passes, never turning around, the operators cut into a windrow top using sharply tilted blade corners, one blading to the right and one to the left. This "quarter crowning" slit the windrow clear to the bottom, getting at the core which tended to have extra density under the windrow weight. The method was designed to help secure a more equalized density in the spread. Also, with one blade working forward and one backward, the longitudinal movement of material was balanced out, contributing to a more accurate depth.

The second large windrow was similarly broken down, then the small shoulder windrow was cut down from the near side and bladed entirely across the 25 ft. base width.

During the first laying-out passes, a Huber 12-ton 3-wheel roller darted in several times to iron out ruts left by the grader tires. This was another refinement to aid uniform density and also to accomplish part of the compression, so that the finish blade operator could better gauge the remaining compression involved in bringing the base to final trim.

Also, one or two sprinkler passes were usually made in the midst of the breakdown blading, depending on air temperature. Both roller and sprinkler backed in or out, never turning around, since turns disturbed the material.

Trim and Final Rolling

The finish blading, trimming and rolling were performed as a separate operation, using another Cat 12 and two Huber 3-wheel rollers with a Tampo 13-ton 2-axle pneumatic-tired roller for final rolling. One 2,500-gal. sprinkler usually sufficed for this section, applying a fog spray during early morning hours and going to a heavier application as the day warmed up. Tight-blade finishing was in 800 to 1,000 ft. sections, the principal limitation being that final rolling had to be completed within two hours after mixing. After checking for elevation and surface trueness (¾ in. tolerance in 10 ft.) with a choker board and a straightedge, the treated base was sealed within another hour using 0.2 gal. per sq. yd. of RS emulsified asphalt.

The procedure here outlined produced about 6,000 lin. ft. (6,300 tons dry aggregate weight) of treated base per 10-hour day. A maximum day of 6,400 ft. was recorded. The daily progress, however, was often considerably less than this because of delays for other parts of the work.

The Baldwin asphaltic paving including production of aggregates by a subcontractor will be described in a separate article.

The project is under the Marysville district of the California Division of Highways, A. M. Nash, district engineer; P. R. Lowden, assistant district engineer for construction; Don McCollom, district construction engineer; and Don Hislop, resident engineer. George T. McCoy is state highway engineer.

Baldwin Contracting Company and the Miles & Son base work were directed by Al Vercruyssen, project manager, with Wm. N. Stanley as superintendent; and John Zerkovich as crushing plant superintendent. W. H. Baldwin is president and Al Regalia, vice president and manager of Baldwin's highway operations. George Obenosky represented Miles & Son under the direction of Harold Buttles.

California Leads in Cement Treatment

Cement treatment, more commonly called soil-cement or cement-stabilization in the middlewest and east, is in the spotlight this year as having come of age on its 20th birthday out of the experimental laboratory. California is not only Number 1 among highway agencies in utilizing soil-cement, but also is in the vanguard in design and construction technique.

The state's contractors have taken no little part in evolving more efficient and rapid methods aided by equipment manufacturers. As reported by J. A. Leadabrand*, manager of Portland Cement Association's soil-cement bureau, in states outside of California, practically all types from silty or clayey soils to imported clean sands and gravels are being utilized today for soil-cement or cement-treated base. The purpose in all cases is to provide a high quality base for a bituminous surface.

California applies cement treatment to a wide range of granular materials,

*"New Trends in Soil-Cement Construction," by J. A. Leadebrand; presented at 34th WASHO annual meeting, Jackson Lake Lodge, Wyoming, Sept. 9-11, 1955.

either imported or in place. Sometimes the old bituminous surface material is included.

A prime advantage of cement treatment often is its economic saving in the total job logistics; especially in processing soils or surface aggregates already in the road, use of hauled-in soil material is reduced or entirely avoided. Treatment of bases for heavily traveled arterial roads in California however, have more often involved select or specification material.

In California, cement treatment falls under two categories in the standard specifications: Cement Treated Base, and Cement Treated Subgrade.

Cement-treated base for bituminous surfacing is of Class A, B or C design, depending primarily on how heavy the traffic. Classes A and B have the advantage of reducing the total structural road thickness required to achieve the desired load-carrying capacity, as compared with a bituminous pavement on untreated material. Also, the treatment often makes it feasible to utilize a cheap local material rather than a more costly imported or processed aggregate.

Class A treatment, for heavy traffic and utilizing a good quality base material, is designed under a strength and gradation specification. Cement content is between the limits of 3½ and 6 percent, dry weight of combined materials. Richer than 6 percent mixed are not usually desired. The cement content is determined from laboratory tests of 4x4 in. cylinders, the required compressive strength being not less than 650 psi in seven days.

Class B treatment is similar in design, except that cement is between 2½ and 3½ percent and the strength requirement not less than 300 psi at seven days. Class B treatment is for ramps and lighter traffic road bases. It is also used at times for the lower lift of a base thicker than the 0.58 ft. maximum usually permitted in one lift.

Class C cement-treated base with 1 to 2½ percent of cement is used in California to improve the resistance value "R" of a roadway or borrow material, or to offset chance inclusion of poor clay, stabilize a working table for equipment, or bring sub-standard material up to specifications. No strength requirement is given. Class C is not recommended where the margin of correction of a soil is large.

Cement-treated subgrade in California is a term applying to treatment of material immediately beneath portland cement concrete pavement. It is virtually a standard procedure for freeway construction where the pavement is concrete. The purposes are to create a base layer that will resist infiltration of moisture from above or below, provide a more even support for the pavement, and obviate erosion and resultant pumping at joints or cracks.

While not designed to a strength specification the aim is for 200 to 300 psi at seven days; higher strengths are considered to represent an uneconomical use of cement since structural strength is not the chief objective.

Materials used for cement treatment of all classes in California are usually limited to those which are granular and friable and which can be pulverized easily, yet have sufficient binder. These materials offer little trouble in meeting the requisite of thorough pulverization and intermixing with cement, and have better strength characteristics.

● Straightedging to check trueness of treated base.

Strength considerations make important the relationship between the amounts passing the No. 30 and the No. 200 sieve; usually the specification requires that not less than 15 per cent nor more than 40 percent of the No. 30 material pass the No. 200 sieve. In Class C work where the soil is a fine sand, the upper limit of the permitted 1 to 2½ percent cement range is recommended, in order to offset shear failures which have sometimes occurred in the top of the base. Intermixing of broken pavement or other course material with such sand is desirable.

Construction course offered with contractor help

The Civil Engineering Department at Stanford University is now offering a one-year graduate program directed specifically at construction. Its aim is to give students a fundamental backbround in subjects important to the industry, including management techniques, law, labor problems, and human relations as well as engineering.

The course, which has been established with the advice and counsel of leaders in the construction industry, is among the first leading to a Master's in civil engineering. It is an extension of the undergraduate construction program established as a civil option in 1946.

The graduate program will be broad and in addition to civil engineering will offer a choice of classes in the Stanford School of Business, and in industrial engineering, law, geology, mining, and parallel fields. In announcing the program, F. E. Terman, Dean of Engineering, said: "The value of a year's graduate study far exceeds the cost . . . the man has the opportunity to pull his education together into a logical whole and to extend it into non-technical areas of critical importance to contractors."

Classes will be small with a high degree of individual attention. Under faculty guidance each student will be given wide latitude in planning a program for his personal needs. A new series of graduate courses in construction, made possible by additions to the staff, will provide continuity and direction to the entire program. The graduate work is planned to broaden each student's training into non-technical areas not covered in undergraduate study, as well as provide a systematic course of instruction leading to management responsibility.

Leading Contractors and the California Chapters of the Associated General Contractors have helped select the courses and prepare the graduate program, as they have formerly participated in the undergraduate training of Stanford engineers for careers in the construction field. The contracting industry will also provide a series of speakers to address the graduate classes on specialized subjects.

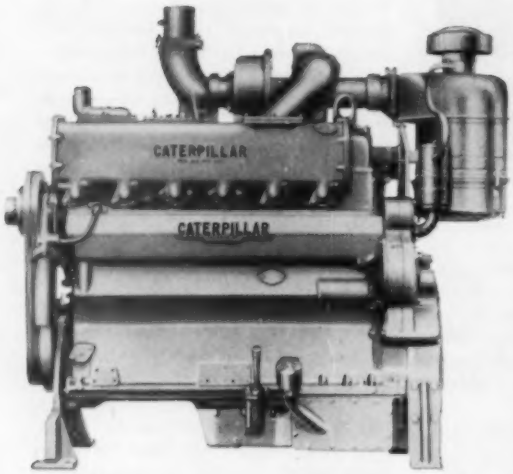
More than half the civil engineering undergraduates at Stanford have taken courses in the "construction option," which includes construction estimates and costs, construction equipment and methods, business law, accounting, and industrial relations. A majority of the students graduating from this course have entered the construction field and a high percentage has remained in it, in part because the construction courses are taught by men who have worked for contractors and who understand demands and obligations of the industry as well as its opportunities.

● Average trip length on the New York State Thruway is averaging 64 miles for passenger cars, 84 miles for trucks.

Announcing 2 more new

The new D337

Series F with Turbocharger

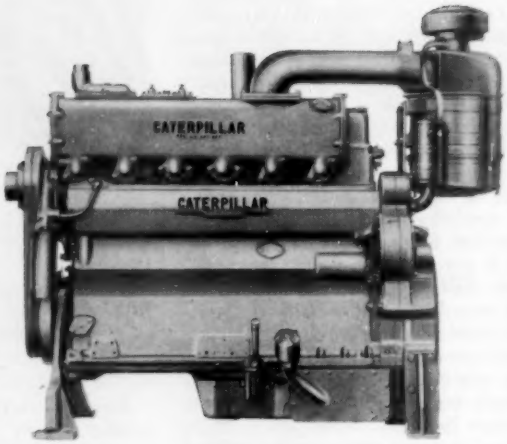


310 HP

maximum @ 2000 r.p.m.

The new D326

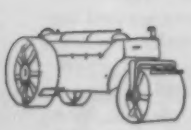
Series F



200 HP

maximum @ 2000 r.p.m.

MODERN, COMPACT, HEAVY-DUTY UNITS FOR



- Aggregate Dryers
- Asphalt Plants
- Excavators
- Rollers
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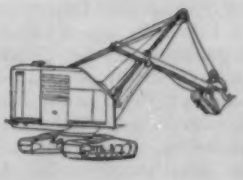

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Available as original power in many types of equipment . . . direct drive or choice of transmissions, including hydraulic couplings and torque converters. Also available as Electric Sets and Marine Engines.

CAT* DIESEL ENGINES

CHOICE OF 3 STARTING SYSTEMS

AIR

For fast starts where a supply of compressed air is readily available, a sturdy vane-type air motor is offered. Also available: air compressors and storage equipment.

ELECTRIC

Where speed of starting and convenience are of greatest importance. Also available: automatic start-stop controls which require no operating personnel.

GASOLINE

For all-weather starting. This system preconditions the diesel and supplies full lubrication before the diesel is started. Also available: electric starters for the gasoline starting engine.

Here are the two newest diesels in Caterpillar's modern, heavy-duty line—more efficient, more compact and more powerful than the units they replace. In *any* application, they offer you more for your money than *any* engines in their power range!

Major advances in design and time-tested Caterpillar features combine to make this power pair more productive and economical to operate than ever. For example:

• New Turbocharger (in the D337 Series F) utilizes exhaust heat to drive supercharger. Delivers air in direct proportion to engine's need—less air at low load, more air at full load.

• New hydraulic valve lifters practically eliminate valve adjustment and provide quiet operation.

• New, improved water jets deliver fan-shaped flow, provide more effective cooling.

• Heavy-duty, oil-cooled pistons with chrome-faced rings, built for thousands of hours of work before inspection is necessary.

• Sealed cooling system reduces mineral deposits.

• Full-flow filtering of fuel and lubricating oil.

• A complete line of attachments to meet all your requirements.

All these and other features add up to a new standard of performance—better operation and more power with less maintenance and long life. For full details, see your Caterpillar Dealer. You can always count on him for reliable information and prompt service!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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NEW D337 Series F and NEW D326 Series F— LATEST EXAMPLES OF CATERPILLAR LEADERSHIP IN ACTION

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I'd like more information on the new D337 Series F ☐, D326 Series F ☐.

. . . for more details circle 185, page 16

Name _____

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City _____ **Zone** _____ **State** _____

Construction Boom to Continue

–Says AGC midyear report; highway outlook brightest, with 90% of contractors foreseeing growing contract volume.

A STEADY surge toward a new record-breaking volume of construction, yet with exceedingly intense competition, is expected for the construction industry during the next six months. A $42 billion year is in sight — up to $43 billion over 1954.

This is the highlight of a telegraphic survey mong the 84 directors and 124 chapters of The Associated General Contractors of America, as reported at AGC's midyear meeting of governing and advisory boards, held Sep. 28-30, in Minneapolis.

Construction activity for the first nine months was 13% ahead of the all-time 1955 record. And from 85% to 90% of the general contractors in building, highway and heavy construction expect as much or more new work to come on the market. A few areas expect declines.

Materials generally are expected to be in adequate supply, except that steel and cement deliveries might continue to be slow as construction continues high. Most predicted higher material and labor prices.

Survey replies indicated a general tone of "cautious optimism" for the next half-year. The AGC represents more than 6,400 firms which annually perform the majority of contract construction of all kinds in the United States, plus a large volume overseas.

The survey showed the following results on the construction outlook for different contractors:

Highway	
Increase	58%
No Change	32%
Decrease	10%

Building	
Increase	52%
No Change	33%
Decrease	15%

Heavy	
Increase	47%
No Change	40%
Decrease	13%

Thus, 90% of the highway contractors — the most optimistic group — anticipate their work will be as good or better in the next six months while carrying out expanded federal, state and local highway programs.

The poll brought few predictions of any let-down in the competition among the growing number of firms who are bidding for jobs. Survey replies:

Competition Among Contractors	
No Change	81%
Increasing	14%
Decreasing	5%

Some replies said the competition was so rough that a number of contracts were being taken at cost or below in order to keep equipment and men at work. One contractor put it this way: "Prospective owners of construction are getting bargains. It looks like they'll keep on getting bargains for another year."

Prices on Bidding

A direct result of the heavy competition in a field of more and more contractors, the AGC poll showed, has been that bid prices have been very low — many below engineers' estimates. More than half the answers received expressed the belief there would be no change in this low level of bid prices for the next six months. The predicted trend:

Bid Prices	
No Change	54%
Decrease	26%
Increase	20%

Several solutions to this problem, as suggested by the replies, were education programs for contractors themselves (and awarding agencies) on proper bidding procedures and current cost trends.

On to Miami!

Meet You at the ARBA Convention

January 11-14 is the date, and Miami Beach is the place for the American Road Builders' Association annual convention. A record attendance is in prospect, with an outstanding technical program and addresses by national leaders. Plus sunshine and the rest.

● Francis A. Davis, purchasing agent since 1948 for the Virginia Department of Highways, has been made chief engineer. He succeeds Burton Marye, Jr., who resigned to become general manager of the Richmond-Petersburg Turnpike Authority.

● One of the most impressive bits of data on the safety of an expressway comes from Detroit. The Street and Traffic Commission of that city reports that the accident rate on Detroit's new expressways are only 2.3 fatalities per million vehicle miles, compared with 18.5 on ordinary surface streets.

Regionally, Here's Contractor Outlook

● *New England* — The disastrous August floods will have a great influence on the amount of work done, will likely tax contractors' capacity particularly because of material shortages. Outlook for the next six months for all construction: normal large volume of work plus much reconstruction.

● *Middle Atlantic* — Generally, high volume of construction with building and highway work a little brighter than for heavy construction. Reconstruction in New Jersey, New York and Pennsylvania will add to the volume. Materials adequate except cement and steel.

● *South* — Sizable increase for highway and heavy firms indicated for next half year. Competition remains keen, but more than half of replies seeing a slackening from this area.

● *Southwest* — Continued high level for highway, building and heavy contractors. This due to good weather, general prosperity, and low prices brought on by intense competition. Materials plentiful, with cement improving.

● *Rocky Mountain* — Highway and heavy contractors expect about the same amount of work as in previous six months. Competition spotty, most materials; cement and steel tighter.

● *Far West* — Excellent six months ahead with all contractors expecting an even greater volume of work. Slight shift from residential to public, highway and commercial construction. Some tight supplies of cement and structural steel.

EDITORIAL

Briefly Noted . . .

Although hopes for an accelerated roadbuilding program failed to materialize in Congress this summer, highway industry leaders know it is only a matter of months until an unprecedented construction boom is given the green light. One of the most sobering problems moving into the limelight already is the acute shortage of engineers to plan and build the much-needed highways. The state that does not feel the pinch is unusual, indeed.

There are 18,034 engineers now in the employ of state highway departments, the Highway Research Board found recently. About 4,000 more are needed. Some states are desperate. Three departments polled by HRB said they have only half as many engineers as they need.

In the light of this increasing problem, soon to become worse, industry leaders are exploring every possibility of relief. There are five steps which, the experts say, can be taken by highway departments to ease the shortage. They are:

1) Development of in-service training programs to increase the efficiency of present staff.

2) Greater use of sub-professionals to relieve engineering staffs of much routine work.

3) Greater use of outside consultants, to "farm out" much of the job.

4) Greater use of simplified, standardized design to cut down on the engineering work load.

5) Launching of aggressive recruitment programs and scholarship plans to make highway engineering attractive to young men.

No state is using all five techniques to full advantage, but a few have gone a long way in employing one or two. They have learned — like private industry — that a profitable operation frequently turns on the quality of the engineering staff.

The review of Virginia's program in this issue is the first of a series to be presented by ROADS AND STREETS, showing how some of the more progressive states are meeting the engineering shortage.

•

Now that the big highway program has been delayed by Congress, signs of new stirrings in turnpike headquarters are in evidence. Among these is the fresh announcement that advanced engineering is in progress for determining the route and feasibility of a fork-shaped Ohio Turnpike Project No. 2. This would connect Cincinnati with a string of cities diagonally to the Northeast and also with Toledo. With the East-West Ohio turnpike soon to be completed, Ohio thus expects to have nearly 600 miles of toll roads.

We venture that some day this big toll road mileage, *plus* all the interstate system development that federal funds can be obtained for, together will not overbuild the Ohio network for this heavily populated industrial state. Highway department in general (and their legislatures) are still underplanning for future needs.

•

Let's see a show of hands. How many of you have ever read the dull and dreary annual reports of any state, county or city highway organization except your own? Probably none of you. Such documents have been a plague and a waste of money in past years in many instances, obviously being gotten up merely in compliance with some law.

In startling contrast is the annual report for 1954 of the Ohio Department of Highways, off the press recently. This attractive document, 8½ x 11 inches, would do credit to one of our equipment advertisers as an example of good typography, printing, use of pictures and color, and all around readability.

Probably it costs no more to produce than the other kind. We recommend it as an example worth looking over before any highway department gets out another report on its accomplishments.

•

A new twist in this modern day of traffic problems was recommended recently in Sacramento. A police committee is toying with the idea of fining the railroad for each time a train blocks Fourth Street more than five minutes. A $500 parking ticket.

•

Several months ago on this page, we invited readers to submit ideas for a slogan which would succeed the one you see at the bottom of the page. Quite a few excellent ideas were received, and we take this opportunity to thank any and all whom we might have missed with personal reply.

For the time being, the editors vote to keep the phrase, "It Costs Less to Build Good Roads than to have Poor Roads." The final case of road building is an economic one and this phrase adapted from a statement by former Commissioner of Public Roads, Thomas H. McDonald, seems to get to the heart of our case for investing public funds in better highway facilities.

IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS

Just Off the Press! Simple Explanation About Cost-Saving Advantages of Soil-Cement Stabilization for Base Courses

Details the Inexpensive Methods Used to Assure Longer Surface Life for Highways, Roads, Streets and Airports

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This new booklet removes all of the so-called "mystery" about soil-cement. In fact, you will wonder why you have not insisted on soil-cement base stabilization for all traffic projects. Detailed are why base courses and surfaces last longer and require less maintenance under the heaviest traffic, the use of native materials, and how construction time and costs are lowered with the method described. Send coupon today!

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Roads and Streets in the News

$69 million bonds for Virginia Turnpike

Early construction of the turnpike between Richmond and Petersburg, Virginia, is assured by the sale of $69 million of revenue bonds. The issue was sold by a group of investment bankers, totalling 244 members. Net interest cost to the Richmond-Petersburg Turnpike Authority will be 3.5 percent interest. Bonds were quickly sold at an offering price of $100.

The 34.7-mile toll road is to be built under a schedule with an opening date set for April 1, 1958, with full completion of the trimmings by Mid-Summer of 1958.

Connecticut seeks funds for flood repair

Provision of state financial aid for the repair of flood damage to highways, streets and bridges was one of the major problems scheduled for consideration by a special session of the Connecticut legislature expected to be convened in late October.

State highway commissioner Newman E. Argraves estimated that flood damage to state highways and bridges throughout the state for the late Summer storm alone, amounted to $18,600,000, while such damage to city and town roads and bridges approximated $11,916,000.

Georgia bonds upheld

Constitutionality of a 1955 state legislative act creating the Georgia Rural Roads Authority, empowered to issue up to $100,000,000 worth of revenue bonds for rural roads projects, was upheld by the State Supreme Court. The ruling was given in a test suit brought by the state against the authority in order to expedite the sale of authority bonds. An initial issue of about $10,000,000 was expected.

Bonds issued by the five-member authority will be paid off from rentals collected from the state highway department. A portion of funds which has been going to counties for road maintenance will be used to pay the rentals. Although empowered to issue up to $100,000,000 in bonds, the authority is restricted to $30,000,000 without specific permission from the governor to spend more.

Higher bonding limit asked in Pennsylvania

Governor Leader recommended in a late-September special message to the Pennsylvania legislature that the state highway and bridge authority be given virtual blanket authority to raise its borrowing capacity for highway and bridge construction projects.

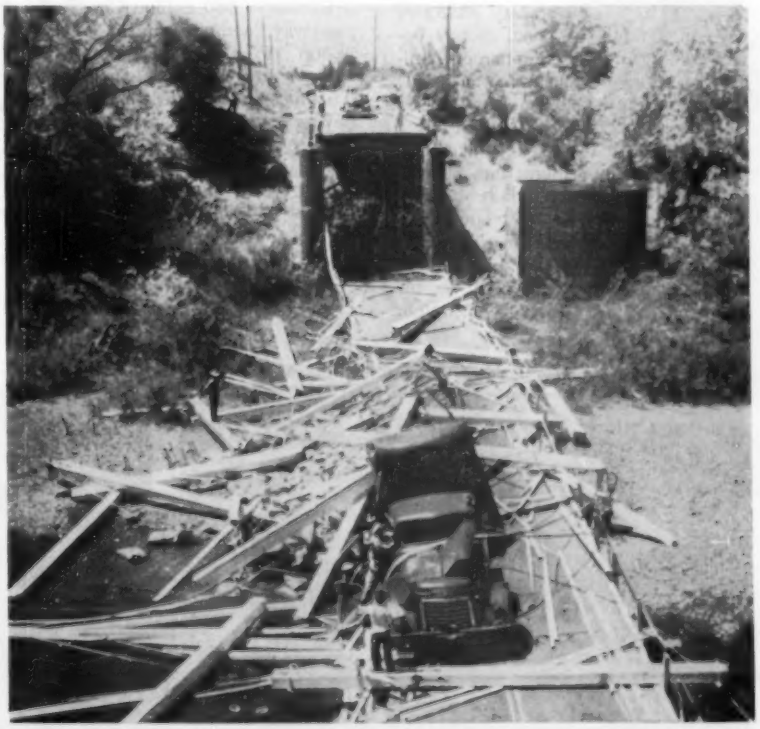
Although he had been expected to ask for $50,000,000 to $100,000,000 added borrowing capacity, he declared that legislation should be enacted to give the agency full power to borrow up to an amount required in matching funds needed to acquire federal highway aid. Matching funds during the 1953-55 biennium amounted to $52,000,000.

The authority builds major highway and bridge projects and rents them to the state highway department, using rental income to amortize its revenue bonds. Its borrowing capacity was increased in 1951 from $40,000,000 to $80,000,000. This limit has been reached.

Florida to speed work with private engineers

State road board voted recently to adopt a policy of hiring private engineers where necessary to speed Florida's road building program. Chairman Wilbur Jones said the department's own engineers were working overtime to get plans ready but were unable to keep abreast of the demand.

"We have an obligation to the counties," he said, "particularly if the money for a road is available but we can't get the plans out in time. The practice will, however, have to be closely supervised."



● Another old bridge gives way. Almost every day over the nation the press carries such pictures. This old (1902) structure was a 150-ft. crossing at Oakdale, California. A heavy truck did it. (Associated Press Photo).

● Piledriver operation marks beginning of construction for an interchange structure near Portland, Oregon, on U. S. Highway 99. Equipment: Bucyrus-Erie 22-B transit crane with Vulcan No. 1 piledriver. Consolidated Freightways of Portland, sub-contracting from Lee Hoffman.

Ohio Turnpike proving profitable from start

The tollgates on the 241-mile Ohio Turnpike, now completed entirely across the State, passed 346,880 vehicles during the first nine days after the October 1 beginning of full-length operation.

Cash revenue totalled $328,690 and substantial additional money began coming in from commercial haulers operating on charge accounts, revenues from restaurant, gas, oil and other concessions, etc. Cash revenue alone in the first nine days averaged $36,500 a day — more than enough to cover the $29,000 daily interest charge. The concession revenues will pay an additional profit over the cost of administration.

Truck traffic is expected to increase steadily as truckers compiete economic studies of time and cost savings, and alter their schedules to take advantage of the new highway.

4½ miles of Chicago expressway to open

Chicago's $50 million Congress Expressway, leading from the downtown "Loop" to the west side, will be opened to traffic for an additional 4.5 miles before Christmas. Concrete pavers have been at work all summer on several contract sections west of Ashland Avenue, hampered by a shortage of cement. The entire superhighway, which has been under construction for several years, will be ready in 1958.

According to Roger Nusbaum, expressway engineer for the Illinois division of highways, a traffic jam is expected while motorists are learning to utilize the new 4½ miles. The jams will likely occur at the ends of the new section, where ramp facilities will not have been fully developed and where the surface streets will have to perform a dispersal function.

Milwaukee to make start on expressways

The $221 million program of expressways planned for Milwaukee city and county will reach the dirt-flying stage in 1956, with a modest initial $5 million in construction.

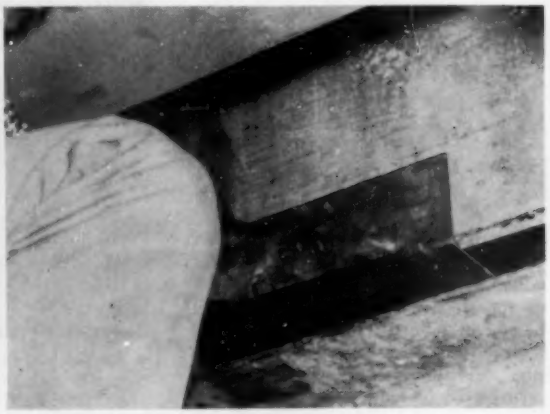
The work of acquiring right of way has been ordered for a section of Claybourn-Blue Mound expressway, east-west link, with $3,672,000 allotted for construction and $1,642,000 for right of way.

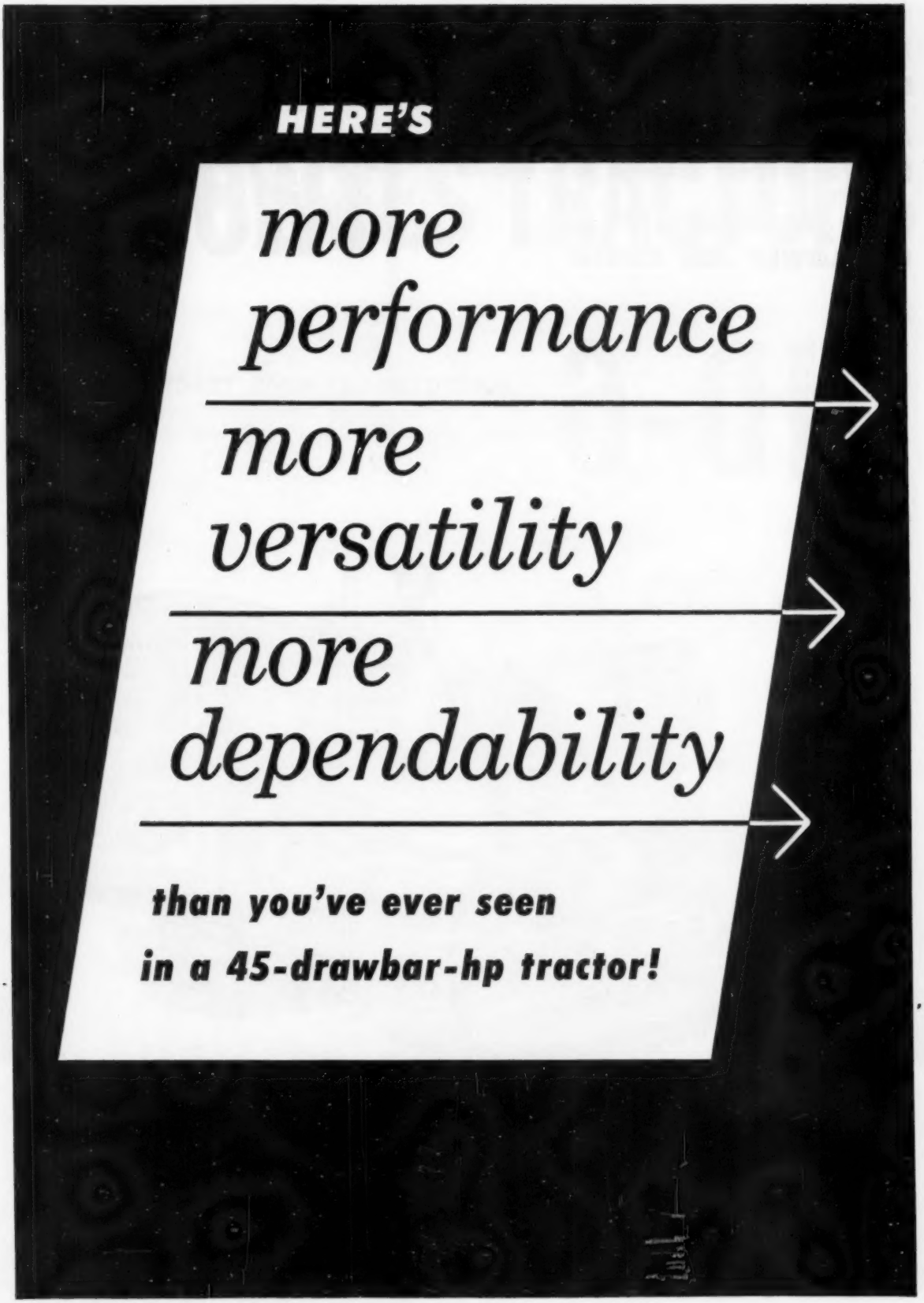
Monel dams in deck for corrosion resistance

To check the destructive effects of uneven expansion and contraction, heavy traffic, ice-dissolving salt, rotting leaf acids and other debris, municipal engineers in New York City have installed 16-gauge, corrosion-resisting Monel dams under open expansion joints.

One application of the dams is in the famed F. D. Roosevelt Drive that runs along New York's East River where .062-in. Monel sheet was fastened under the expansion joints to keep water from eating away the steel reinforcing rods, drainage gutters and water stops. Installation of the corrosion resisting dams protects and prolongs the life of these members and keeps water from infiltrating the roadbed.

● One of New York's viaducts fitted with Monel device in deck joints; and showing typical detail of installation.




HERE'S
more performance
more versatility
more dependability
than you've ever seen
in a 45-drawbar-hp tractor!

more performance . . .
FOR SUSTAINED HIGH OUTPUT!

more versatility . . .
FOR A WIDER RANGE OF WORK!

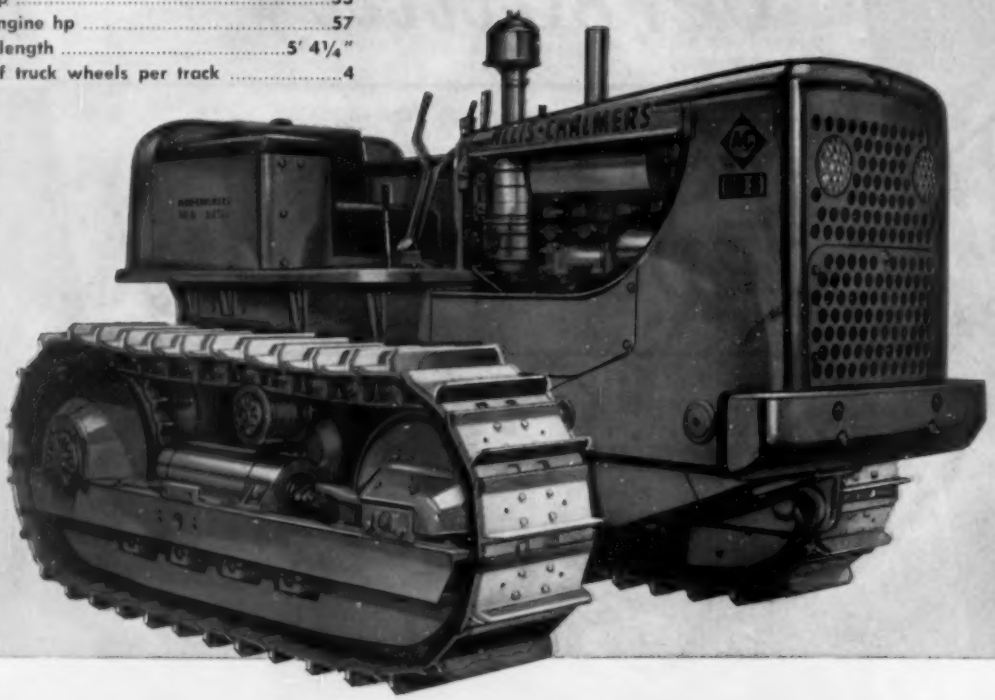
more dependability . . .
FOR LOWER JOB COSTS!

TWO NEW

HD-6

BULLDOZER-DRAWBAR TRACTOR
. . . an all-round tractor balanced for outstanding performance with both mounted and drawn equipment.

Weight	12,400
Drawbar hp	45
Belt hp	55
Net engine hp	57
Track length	5' 4¼"
No. of truck wheels per track	4



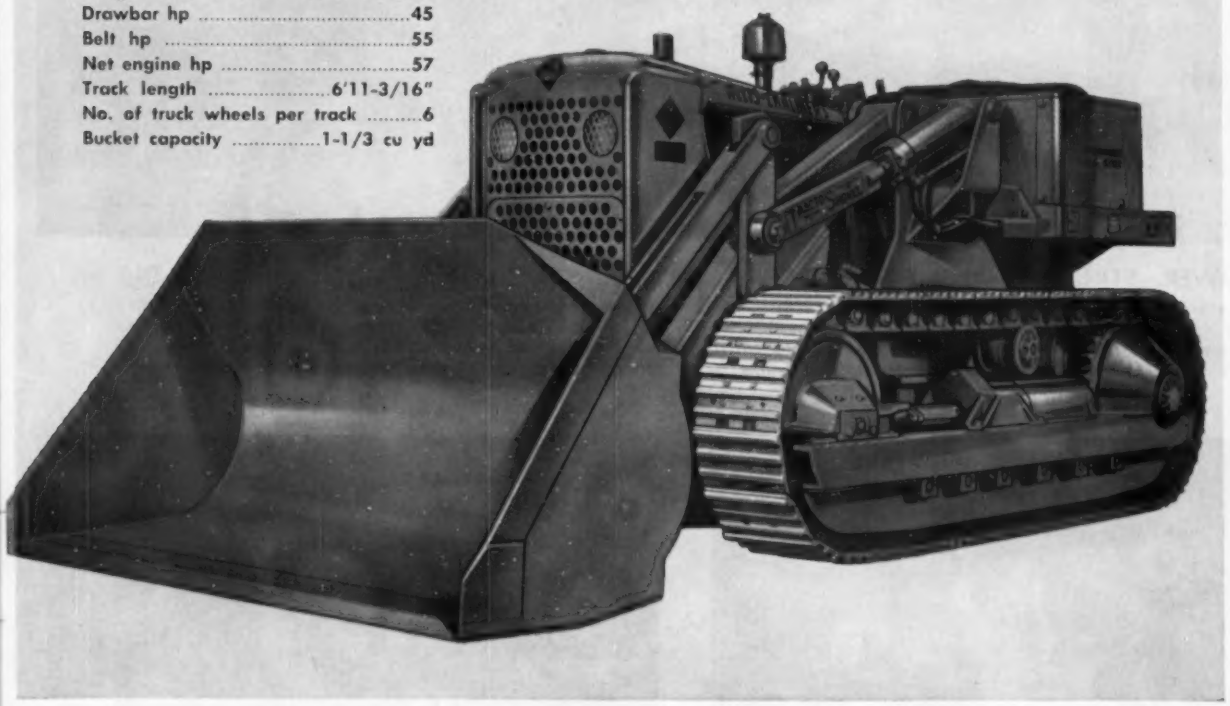
WITH ALL THE IMPORTANT PERFORMANCE ADVANTAGES OF ALLIS-CHALMERS ADVANCED BASIC DESIGN . . .
tested and proved over millions of operating hours!

ALLIS-CHALMERS ANNOUNCES HD-6 SERIES TRACTORS

HD-6G

TRACTOR SHOVEL
. . . with the shovel a "built-in" part of the tractor — not just an attachment.

Weight	19,600
Drawbar hp	45
Belt hp	55
Net engine hp	57
Track length	6'11-3/16"
No. of truck wheels per track	6
Bucket capacity	1-1/3 cu yd



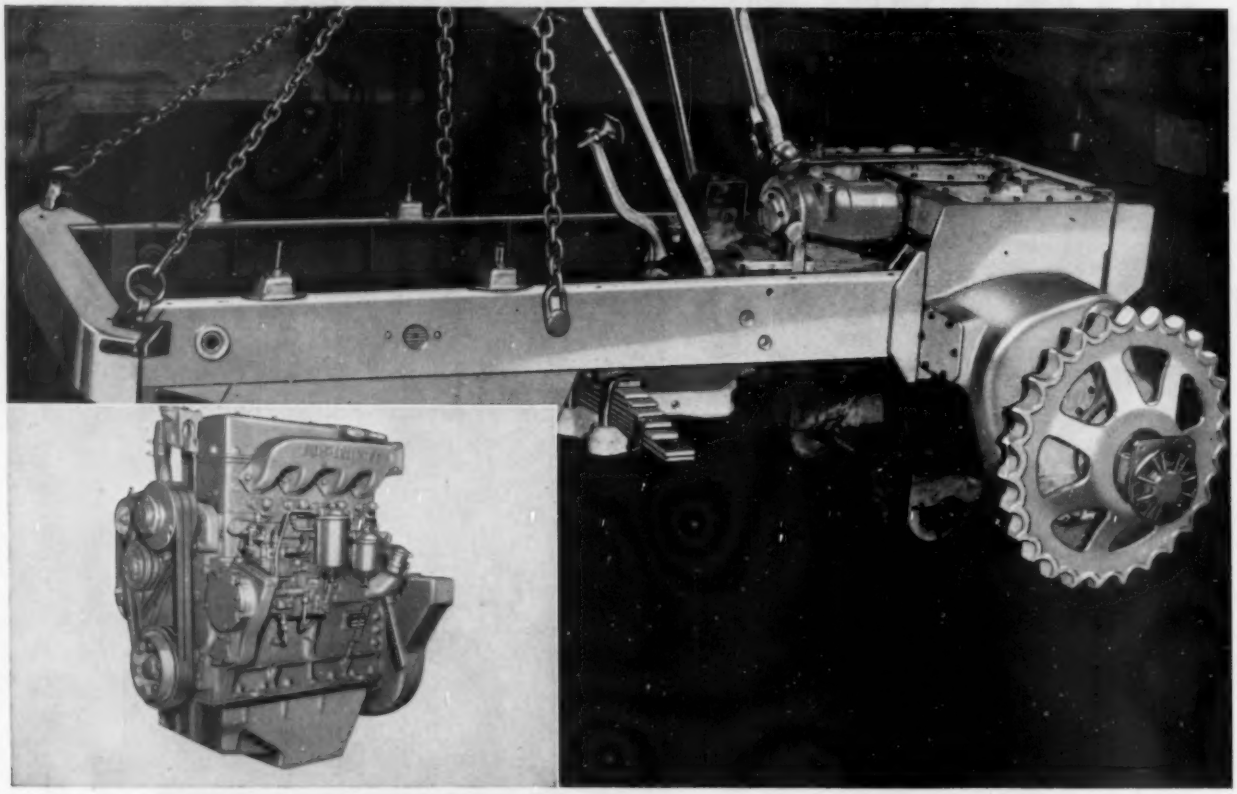
The HD-6 series represents the most advanced engineering in the tractor business — not just in features, but in *basic design.* That means plenty of power, balance throughout the tractor, strength in *all* components, weight in the *working* parts where it does the most good, and big safety factors. It also means engineering for the use of mounted equipment, and for easier, better operation and maintenance.

Following are just a few of the many features that reflect this advanced basic design . . . help to bring you higher production, more work done . . . lower job costs.

. . . for more details circle 178, page 16

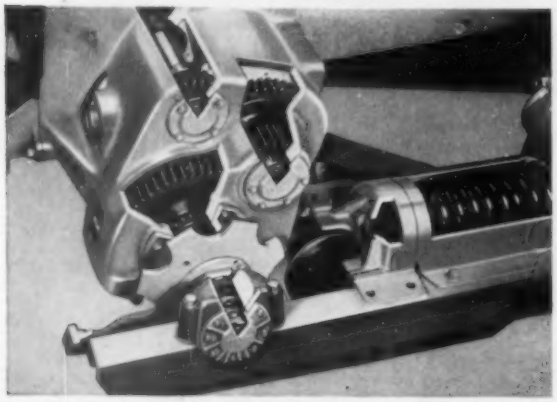
Inside Facts on

NEW ALLIS-CHALMERS HD-6 SERIES TRACTORS



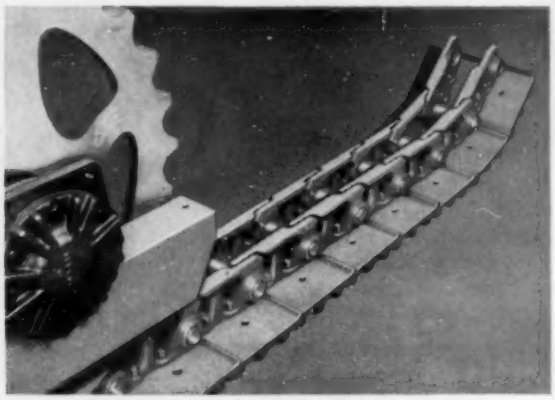
POWER, STRENGTH AND PROTECTION

Here are two important features of the HD-6 series. First, the new Allis-Chalmers diesel, with follow-through combustion — a sure bet for top performance, long life, low upkeep costs. Second, the exclusive all-steel box-A main frame. It protects the entire power train from shock loads, makes possible superior over-all balance, better equipment mounting . . . plus the service simplicity of unit construction. Major assemblies like engine and clutches can be easily removed without disturbing adjacent parts.



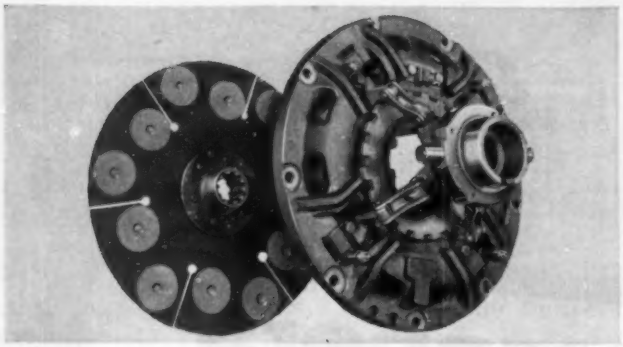
STRADDLE-MOUNTED FINAL DRIVE GEARS

Tapered roller bearings support both ends of the final drive gear shafts. With smaller gears and shorter shafts (plus line-bored, one-piece case), that means better bearing and gear alignment, more strength, longer life . . . even with the big load requirements of today's mounted equipment. And *double-reduction* final drives provide greater ground clearance.

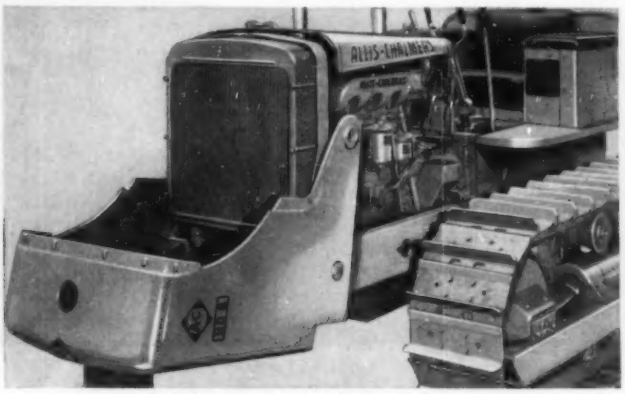


NEW-DESIGN, HEAVY-DUTY TRACK

The best available methods in metallurgy and manufacturing are used to produce HD-6 track that will provide long life under the toughest conditions. In addition to new over-all design, HD-6 sidebars benefit from new heat-treating methods which make possible new standards of strength and hardness *throughout* for extra wearability.

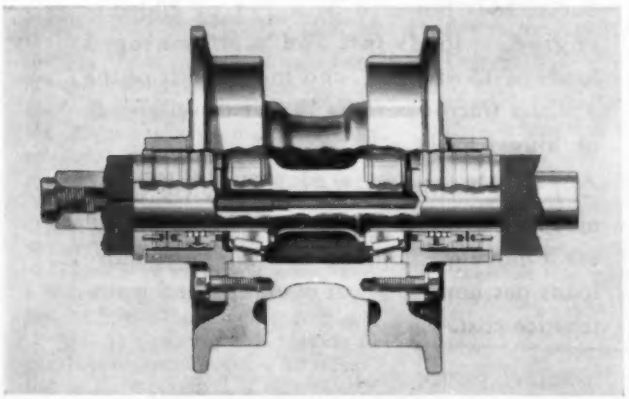


EXTRA CLUTCH LIFE — WITH CERAMIC LINING — The HD-6 master clutch offers simple, single-plate, overcenter design. Revolutionary new *ceramic* button clutch lining keeps clutch operating longer between adjustments . . . lengthens clutch life . . . reduces lever pull for easier operation.



BIG, WELL-PROTECTED RADIATOR

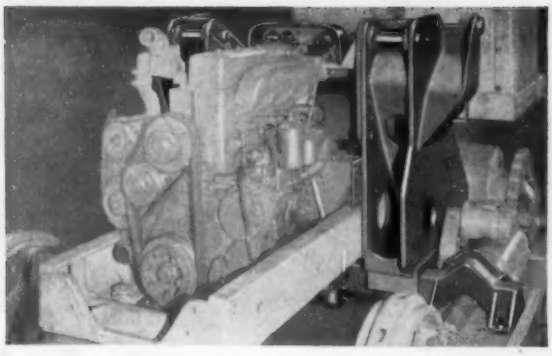
Extra large, one-piece radiator provides all-weather cooling capacity. "Wrap-around" guard enables core to be mounted independently of guard for maximum strength and protection . . . and guard tilts forward for easy service accessibility.



SIMPLIFIED LUBRICATION

Truck wheels, idlers, support rollers need lubrication only once every 1,000 hours . . . because tapered roller bearings let Positive Seals work effectively to keep out dirt and moisture. No lube points under the tractor . . . no lubrication needed more often than every 75 hours. Go from one to two weeks without needing a grease gun.

. . . for more details circle 178, page 16



HD-6G TRACTOR SHOVEL FEATURES

Here's the HD-6G shovel frame mounting assembly. The base of the side frame is mounted in the front to the tractor rigid beam, and at the rear to the truck frame. The upper part is bolted to a heavy steel "stabilizer" forming the cowl of the tractor. Together with the HD-6G's new hydraulic system, it provides greater strength, service simplicity and operator visibility. The HD-6G also offers a new two-position bucket, a two-speed reverse, and has extra long track, with six truck wheels on each side.

FEATURES AVAILABLE *ONLY* IN HD-6

. . . no other tractor in this size class has them — all-steel main frame; one-piece steering clutch and final drive housing; double reduction final drives; welded steel truck frames; roller bearing truck wheels, idlers and support rollers; extra-heavy truck wheels and guards available; Tru-Dimension tracks; wrap-around radiator guards; engine-mounted bulldozers; heavy-duty Allis-Chalmers diesel engine with "follow-through" combustion; rubber engine mounting pads; ceramic button master clutch lining; unit construction; 1,000-hour lubrication intervals for truck wheels, idlers and support rollers; 24-volt direct electric starting (standard); crankcase guard (standard); bumper and lights (standard).

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Euclid S-7 Scraper, shown at left working on a road job in Washington, has excellent power to weight ratio and good maneuverability for close quarter work. It's designed for easy operation and accessibility of all major components.

Euclid Scrapers make the dirt fly!

Working on highway relocation in Arkansas, Euclid 12 yd. Scrapers spread their loads on the run. This model has a 194 h.p. engine and the stability to travel at higher speeds over longer haul distances with heaped loads up to 15 yds.

OWNERS in every part of the country report that "Euc" Scrapers out perform all others of comparable size . . . get more work done at lower cost on all kinds of road construction and maintenance jobs.

For county and township work, secondary road building and other relatively small yardage jobs the new Euclid S-7 Scraper has a lot of cost cutting features. It utilizes the same lever type hydraulic operation used in larger Euclid Scrapers . . . eliminates the down time and expense caused by cable breakage. The S-7 has excellent power-to-weight ratio — 7 yd. struck capacity and 143 h.p. — and good maneuverability for close quarter work.

On medium yardage projects where haul distances are longer and larger loads must be hauled, the 12 yard "Euc" is a low cost producer. It is powered by a 194 or 200 h.p. engine . . . loads fast and carries heaped loads of 15 yards . . . and the stability of the 4 wheel tractor permits higher travel speeds on longer hauls.

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. . . for more details circle 207, page 16

Virginia's In-Service Training Program

By Duane L. Cronk

"More engineering sooner" is goal of Virginia department's four-year course for new engineers.

THE engineering shortage is a problem of long standing in the Old Dominion state. Virginia's Department of Highways has 376 engineers administering a $50-million construction and maintenance program this year. It needs 62 more, officials say.

It is little wonder that when discussion arises about prospects for a coming federally-sponsored roadbuilding program, Virginia wonders where the engineers will come from to plan and construct the proposed highways. If the national road plans considered by Congress this summer are accepted next year, Virginia will need 646 engineers instead of 376. Just thinking about it, Personnel Engineer Charles Nelson says, "We get right much worried."

Like other state highway departments, Virginia's has to find additional engineers and learn how to make better use of its existing staff. Unlike most other highway departments, however, Virginia has an ace up its sleeve. That is an in-service training program which is one of the most advanced in the land — fast becoming her best bet for beating the engineering shortage.

Ten years ago, Virginia found herself desperately short of engineers.

"Those were the trying years," Personnel Engineer Nelson recalls. "We had to hire anyone willing to tackle the job. We weren't in a position to question his qualifications, his education or his experience. If he was willing and would accept the pay we were offering, he got the job."

Low salaries, lack of opportunity to advance, lack of an adequate retirement system, fear of political uncertainties, and lack of an adequate in-service training program were reasons why young engineers were not banging down doors to get into the highway department.

Then far-sighted individuals in the department went to work. They came up with a series of new salary scales which they sold the governor on, they developed a retirement plan, and they opened up whole new promotion possibilities through a program of "incentive management." They also came up with a top-flight schedule for development of newly hired engineering graduates. Because of it, Virginia today is getting more young engineers than she could have hoped for previously and is getting more work out of them than ever before.

Robley Winfrey, Chief of Training and Education for the Bureau of Public Roads, said recently, "The Virginia Department of Highways has as complete a program of in-service training as any of the highway departments."

That is about as close as an educator comes to saying, "There ain't none much better."

Here is how it is working for Virginia.

Four years from pillar to post. The engineering graduate who chooses to join the Virginia Highway Department enters upon a four-year, on-the-job schedule that carries him through almost every area of highway construction and maintenance. During that time, he is under the direct supervision of veteran engineers.

It is not a formal education program. The graduate has just come from four years in the classroom and is "itching to get to work," officials feel. There are no classes, no rigid schedules, no textbooks, no assignments, no tests. It is a rotation program of "work-experience" opportunities. The new man earns his keep by filling a regular job at each stage. The attraction is that he is given opportunity (in fact, is *required*) to engage in a wide variety of jobs, under the direction of different kinds of supervisors and in various sections of the state. He learns thoroughly that it takes all kinds of men to make a successful highway department operation.

Briefly, his schedule for 48 months runs the gamut as follows:

- Survey party assignment — 6 months
- Location and design assignment — 6 months
- Bridge Division assignment—6 months
- Testing Division assignment—3 months
- Inspection assignment — 15 months
- Resident aide engineer assignment — 12 months

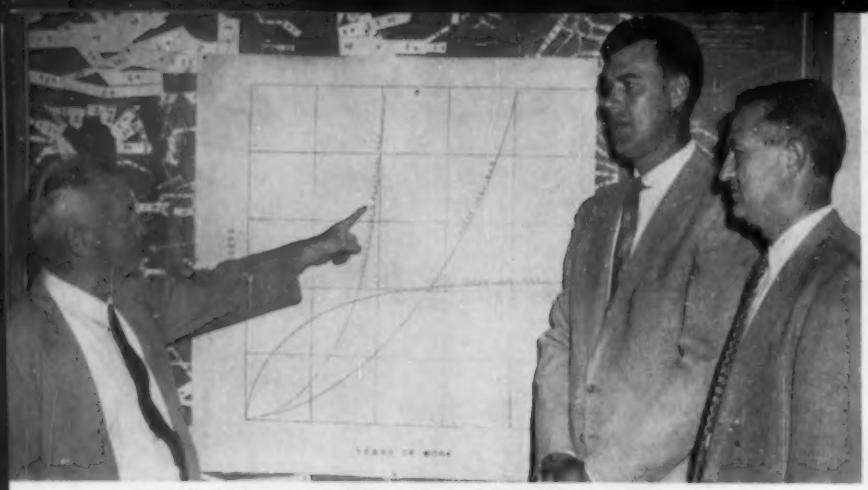
On completion of the program, he may be assigned to a headquarters division or to a resident engineer as assistant.

The trainee is periodically advanced in salary, thus boosting morale throughout the training period. The schedule set up is:

Starting salary	— $328
At end of 9 months	— 344

In 1945 when Virginia drew up a four-year training schedule for engineering graduates, it was a pioneering venture — the first in the country. Today, 10 years later, Virginia's state highway officials are convinced of its value. It has paid off in two ways: (1) as an incentive to attract graduates to the department, and (2) as a medium to bring them to greater productivity in as short a time as possible.

Here is how the program is helping Virginia on both counts.



● Virginia highway commissioner General J. A. Anderson, discussing with W. C. LaBaugh and Charles Nelson a curve showing the prospective advancement of the average department engineer.

At end of 18 months — 360
At end of 27 months — 376
At end of 36 months — 392
At end of 45 months — 410

How Program Administered

Although the Personnel Engineer and the Director of Training are in charge of the program, it is administered in practice through established operating channels. The trainee is not responsible to the Personnel Department but to the engineer in whose department he is working at the various stages of the program. He does file monthly reports to Personnel in which he describes what he is doing and how he is getting along. Personnel can, and does, when necessary, see that he gets the variety of experiences called for. On the whole, however, it is the supervising engineer who takes the trainee in charge. These men are briefed on objectives of the program at periodic highway conferences and they, in turn, get the practical problems involved off their chest.

The results of the program to-date have left Virginia highway administrators enthusiastic. Although the cost has been negligible, some 30 men who have finished the program since 1950 are still with the department. They represent 50% of those who began the four-year sequence. Considering the increasing attraction of higher salaries in industry, Personnel Engineer Nelson is happy that losses are not heavier.

"Sure, we know we're training some men who will leave us for greener pastures, but if we continue to keep half of them, we'll still consider the program productive."

In addition to the 30 men who have become affilated with the department upon completion of their training, there are 40 more still in various stages of the program. That adds up to 70 graduate engineers working for or soon to be available to the department. When one considers that Virginia has only 40 graduate engineers other than these men, he can appreciate the impact the program is having in building up the department.

Graduates of the four-year sequence are already making their weight felt in a number of central office divisions. Eight are resident engineers, a position equivalent to district engineer in other states, where the official has full responsibility for construction and maintenance in his section of the state. Another 17 are assistant resident engineers. That means that of Virginia's 43 resident engineer offices, 22 have a man who has been through the training program.

This is just the start. Virginia officials expect to see the program show increasing results as its reputation spreads and more effort is invested in it. This is the first year that a full-time Director of Training has been on the job — and the graduate engineer training sequence is only a part of a much larger in-service training program that takes in all technical personnel. In previous years, Personnel Engineer Nelson has been able to give it only about 5% of his time.

Top administrators are pushing the program steadily. According to Highway Commissioner James A. Anderson, every engineering job in the department from assistant resident engineer on up should be filled by a graduate engineer as the older men retire. Men in the department credit General Anderson for much of the spirit of self-improvement that pervades the organization. For years, he was Dean of Engineering at Virginia Military Institute and he has some concrete ideas on the benefits of advanced technological training. In a two-minute conversation about engineering education he will manage to toss out a bit of Confucius ("The difference between the trained and the untrained is the difference between the living and the dead") and Aristotle ("To send untrained men into battle is to cast them away"), as well as some original thinking.

More Engineering Sooner

It is all well and good to point out how the engineer is improved by a four-year training program on top of a college education and how his opportunities for advancement are increased. But what does the department get out of it? And when? Where does this fit into the picture of utilizing engineering manpower to the nth degree?

Anderson has a ready answer.

"The simple fact is that we get *more* engineering out of these fellows, and we get it sooner."

(Continued on page 67)

Rounded On-the-Job Program

The in-service training schedule for newly hired graduate engineers is just part of an extensive on-the-job training program promoted by the Virginia Highway Department for all its technical personnel. Some of the other features are:

- Graduate study opportunities — Men are encouraged to take advanced classwork at several Virginia institutions. The department pays tuition costs.
- Short courses — Staff personnel are given opportunity to attend special conferences and short courses conducted by the department. Attendance at these events totalled nearly 2,100 last year.
- Night classes and correspondence courses — Men are reimbursed tuition costs for a number of approved classes of this nature.
- Special schools — Engineers are encouraged to take leave of absence to spend several months or a year at the University of California's Institute of Traffic and Transportation Engineering and Yale University's Traffic Bureau at the department's expense and on a partial salary basis.
- Co-operative Engineering — Arrangements are made for Engineering students to enroll in a work-study program that gives them practical experience with the department along with their college instruction. Students alternate between the campus and the job.

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205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

*Figures available on request—ask your Koehring distributor to see them.

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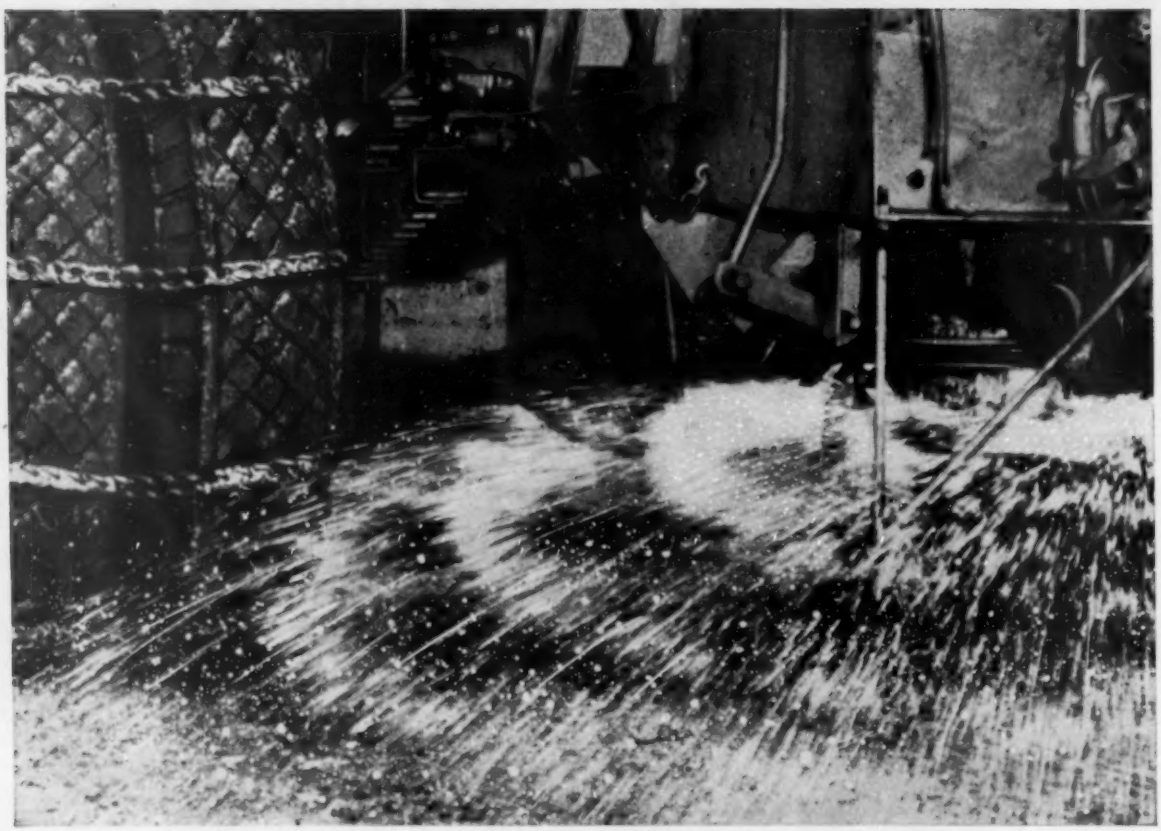

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PELADOW melts road ice fast, brings safety in minutes . . . and does it economically!

Calcium chloride pellets that attack road ice the instant they are spread—that's Peladow®. These pellets are 94-97% calcium chloride. They're practically anhydrous (free from water). As soon as they hit the ice, they take on water and begin to dissolve. Instantly, heat is generated, the melting action accelerated and the ice penetrated as if hit by red hot buckshot. Sheet ice is completely dissolved, heavier layers simply require a follow-up blading to scrape off the loosened fragments.

Speed isn't the only advantage of Peladow. It pleases the budget, too. Because it is practically anhydrous, it contains some 20% more effective solids than conventional flake forms of calcium chloride. It can be shipped in bulk, which eliminates package costs and results in substantial savings in transportation costs. Bulk Peladow can be stored in conveniently located closed bins for fast loading of trucks. It's easier to handle with mechanical equipment, resulting in lower labor costs and faster application. Also available in 100-pound moisture-proof paper bags. For fast ice control at low cost, contact Dow for Peladow shipping and handling information.

Write THE DOW CHEMICAL COMPANY, IN 902C, Midland, Michigan

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. . . for more details circle 197, page 16

(Continued from page 62)

"Look, we have two choices," he said. "We can take a kid out of a grocery store job at 17 years of age and put him on a surveying party, teach him everything the hard way, bring him up through the ranks if he has enough native intelligence, and make him a resident engineer, in 16 or 20 years. We have such men and they have gone that far because of natural ability. But it still took them 16 or 20 years to get there — and that may be as far as we can take them.

"Now take an engineering graduate. He comes to us with four years of good technical education under the belt already — at his own expense. That's a bonus for us right at the beginning. We give him four more years of training in the way we do things, at very little expense to us, and then, in a matter of months, he is ready to become a resident engineer.

R. P. Ellison, the commissioner's executive assistant and a veteran of 44 years service, is just as convinced of the program's merits.

"We capitalize on youth," he said. "We get him up there while he's young and industrious and eager and forward-looking. More productive? Of course so. First he is trying to make a mark, and second, he has an educational background in the latest techniques of roadbuilding. Together they will enable him to produce more and better highways. They're bound to!"

"That's how we are making the most of what we have. It's the best way we know of to beat the shortage of engineering manpower."

Out in Fairfax County, L. A. Bolton, resident engineer and an old-timer in the department, has seen about 15 trainees worked through his residency. His two assistants are graduates of the training program.

"These boys are pretty good," he admits freely. "I don't hesitate a moment to send them out on anything they've covered in their training."

Although not a graduate engineer himself, Bolton doesn't resent the newcomers getting a flying start.

"I came up the long way," he said, "but that doesn't make it the right way. We're getting more out of these boys after five years than we got out of some men after 20 years."

Once in a while a trainee comes in with the idea that the work-experience program is an "observation" program, that he is expected to "observe" but not get his hands dirty. A survey party chief commented:

"I got one of those fellows once, but we disillusioned him. My idea was this is supposed to be something a fellow comes into to get the feel of the job."

All this is not to say that Virginia can yet "pick and choose" graduates. Although he generally recruits in the Southeastern state alone, Personnel Engineer Nelson still finds engineers are hard to come by. He competed with 600 other recruiters at one college in his area last Spring, for example. Of the 40 graduates he found who would have qualified for the training program, only seven accepted his offer.

He credits the four-year training schedule and opportunity for advancement for whatever success he does have in recruitment. "It is the best incentive we can offer," he said.

Nelson does not heistate, in recruiting graduates, to open the book and point out career opportunities in the department. The training program fits a man ideally for a top-echelon job in time. During the next few years, the department estimates, there will be a dozen resident engineering jobs open and as many more positions in even higher-paying field positions.

William La Baugh, who came through the program and is now Director of Training, testifies to the effectiveness of the program as a recruiting tool. La Baugh's progress has been typical. After his four-year grind in the program, he became an assistant resident engineer, then resident engineer, and last year was moved up to become the department's first full-time Director of Training.

Measured against high industrial standards for developing management engineers, the Virginia program has several weaknesses that are gradually being worked out. There probably should be closer liaison between Personnel and trainee. Private industry has found that trainees need frequent reassurances that they are making progress and are not forgotten. An inherent handicap in the Virginia program is the distance trainees are from Personnel and each other. One of the department's residencies is 400 miles away. The administration is seeking to overcome this problem by holding periodic group conferences that give the boys a chance to discuss common difficulties and to exchange experiences. Other plans are in the making for further development of the program. Its already proven ability to get more engineering sooner has convinced Virginia officials of its merits. And as Nelson puts it:

"Virginia needs her share of top engineering graduates, and we expect to get them."

● Highway engineer trainee (center) discusses plans for new U.S. 33 bridge at West Point, Va., with engineers W. G. Swanson and John R. Kampf of Diamond Construction Company.

Details of Virginia Department's In-Service Program

I. Survey Party Assignment
6 Months

1. Preliminary — chaining, levels, and transit.

2. Location surveys — Principles of highway locations, route surveys, running and staking out circular curves, taking topography, locating property lines, running out drainage areas, keeping standard notes, running in profiles, taking cross sections, making bridge situation plans, plotting alignment and topography and plotting profiles.

3. Construction surveys — Establishing alignment, taking cross sections, setting slope stakes, and grade stakes, staking out culverts and bridges, working out grades involving vertical curves, taking final cross section and measuring and computing quantities on completed projects, and keeping standard notes on construction surveys.

4. General — Property surveys, closed transit surveys, adjusted closed surveys, computation of areas, coordinating surveys, and problems involving coordinates.

II. Location and Design
6 Months

1. General — Study of instructions for draftsmen, road design standards and geometric design standards.

(Turn page to continue)

Give Them Responsibility Sooner

"How have we utilized our engineering manpower?" General Anderson's answer: "By bringing that man to a position of responsibility 12, 14 or 16 years sooner than the untrained man. We will get superior engineering out of that fellow through all those 12, 14 or 16 years. That is our second bonus. Our third bonus is this. At the end of those years — probably sooner — although he holds down the same position as the other resident engineer, he is infinitely better qualified to move on up to more responsible jobs.

"Every resident engineer should be a potential chief engineer."

2. Cross sections — Read and check level notes individually and collectively and plot cross sections, draw template, planimetering areas, and computing earthwork quantities.

3. Plans—Plot profiles, read and check alignment notes, plot alignment and topography. Work out office changes in alignment, lay grades, compute quantities for structures, work up summaries. Prepare complete set of simple plans. Make field inspections.

4. Special designs — Study various types intersection designs, parkway and median strip design, pavement transitions and superelevation. Study contour maps.

5. Final estimates — Preparation, computation, and checking.

III. Bridge Division
6 Months

1. Drawing simple structures from sketches, such as substructures (plain and reinforced concrete retaining walls, abutments and piers), concrete superstructures (simple beam spans), and steel superstructures (I-beam spans). Also tracing of drawings and computation of quantities of materials involved.

2. Original design of simple structures listed above, including computation of stresses in main members and details. This includes tracing and computation of quantities as necessary.

3. Stress analysis and checking of simple structures, such as listed above.

4. Final estimate — Check and compute actual quantities of materials for completed structures, from inspector's notebook.

5. Structural steel shop drawings — Check structural steel detail drawings prepared by steel fabricators.

6. Existing structures — Prepare plans for repair and reconstruction of existing bridges.

IV. Testing Division
3 Months

1. Physical laboratory — Specifications and method of tests, coarse and fine aggregate testing, inspection and testing of concrete pipes and reinforcing steel for concrete pavements, and testing of concrete cones and cylinders.

2. Soils laboratory — Preparation of soils samples, study of soils tests and specifications, soils profile studies from field and laboratory work, and design and control of soil-cement and soil-bituminous stabilization.

3. Concrete laboratory — Physical testing of aggregate, physical testing of fresh and hardened concrete, and concrete design.

4. Chemical — Bituminous and Pre-Mix Laboratories — Specifications and methods of tests; testing, inspection, and control of bituminous materials, plant-mixed bituminous pave nents, paints, lubricants, wood preservations, and metals.

5. Geology — Study of geological formations in Virginia with field observation of phenomena.

6. Research — Trainees will be assigned a special project and required to (a) review the literature, (b) prepare a bibliography, and (c) write an abstract covering the assignment.

V. Inspection Assignment
15 Months

1. Assignment as assistant inspector:
A — Study of instruction manual, general specifications, project plans and special provisions.
B — Visual inspection of all materials delivered to project.
C — Inspecting conformity of all drainage installations to line and grade on plans and to specifications.
D — Making soil compaction tests and other inspections to insure satisfactory dimensions of excavation, density of fills and of subgrade in cuts.
E — Checking the proper preparation of subgrade, alignment and elevation of forms.
F — Checking by yield tests the actual conformity of cement content with specifications.
G — Checking protective provisions necessary for concrete during curative period.
H — Checking the conformity to specifications of all phases of construction of all items included in contract.
I — Making up sketch books, reports and records.

2. Assignment as inspector in charge of construction project, performing above duties without assistance.

VI. Resident Engineer Aide
12 Months

General assistance to the resident engineer in many of his varied duties, such as planning and supervision of secondary road work, primary construction and maintenance; estimating and requisitioning materials and supplies; and general administration — including payroll work, reports, investigation of accidents and complaints and handling permits.

Sale of used equipment versus trade in

There are some advantages, say tax writers, in selling old equipment rather than in simply trading it in on new. This means that you may pay a capital gains tax of 25% and in return get a stepped-up basis for depreciation, which, in the case of a corporation, may amount to as much as 52%. Of course, favorable economic conditions must exist to secure such advantages, and this might be a profitable analysis for you to make on contemplated equipment changes. It should be noted that the sale of your old equipment to the party from whom you purchase the new will make this in fact a trade-in. — *Bulletin from Virginia Road Builders Association.*

Meetings Ahead

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS — 41st Annual Convention, Jung Hotel, New Orleans, La.; December 4-9.

AMERICAN ROAD BUILDERS ASSOCIATION 54th annual convention and Highway Materials and Supplies exhibit, Municipal Auditorium, Miami Beach; January 11-14, 1956.

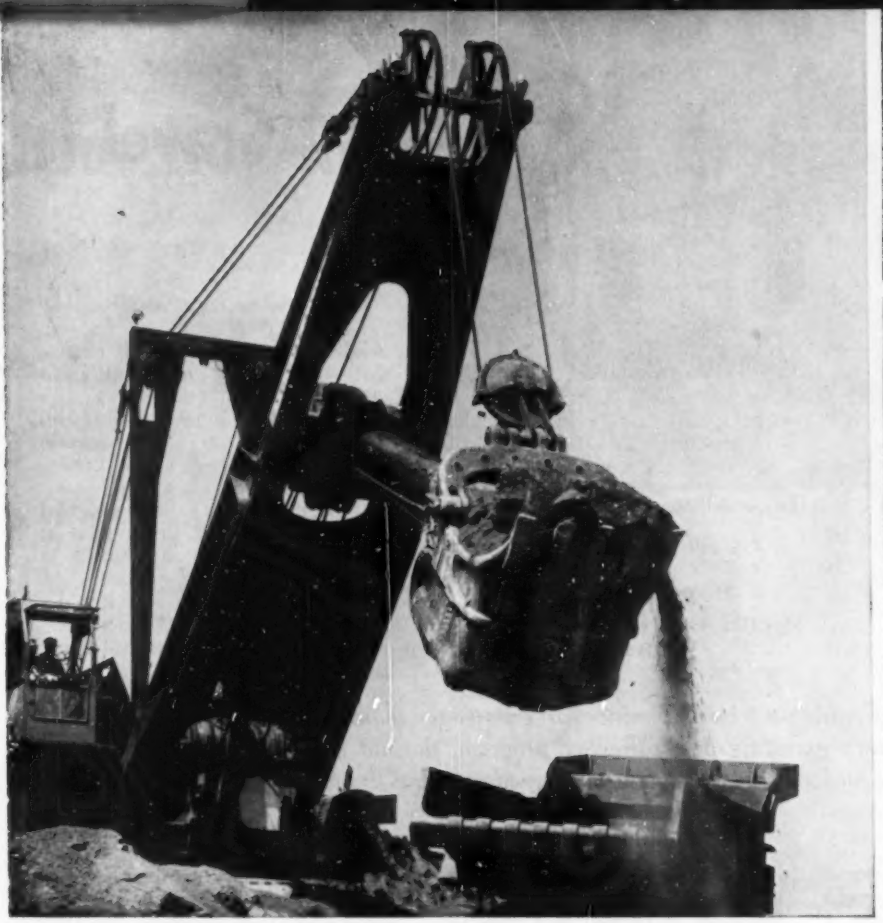
HIGHWAY RESEARCH BOARD — 35th Annual meeting, Washington, D. C.; January 16-20, 1956.

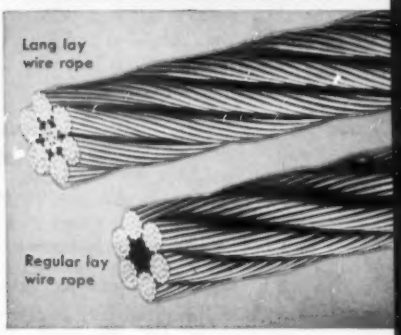
ASSOCIATED EQUIPMENT DISTRIBUTORS — 37th annual meeting, Conrad Hilton Hotel, Chicago, Ill.; January 29-February 2.

SOCIETY OF AMERICAN MILITARY ENGINEERS — Annual technical meeting, Palmer House, Chicago, Illinois; February 9-10, 1956.

THE ASSOCIATION OF ASPHALT PAVING TECHNOLOGISTS — annual meeting, Hotel Cleveland, Ohio; February 13-15, 1956.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA — Annual Convention, Waldorf-Astoria Hotel, New York, N. Y.; February 13-16, 1956.





What extra good will Leschen Lang lay wire rope do for you?

Look at a length of Lang lay wire rope. Compare it with regular lay. Notice that the *wires* in Lang lay rope twist in the *same* direction as the *strands*. In regular lay rope these directions are opposite.

What does that do? It makes the exposed length of the outer wires in Lang lay rope about twice as long as in regular lay rope. It has extra bearing surface to withstand wear from scuffing, rubbing and other abrasive action. Also, because Lang lay wires and strands are laid in the same direction, the rope has greater flexibility.

What's the result? Simply this—on some types of duty, where abrasion and bending stresses are abnormal, Leschen Lang lay rope definitely lasts longer than regular lay. Replacements are fewer. Costs are lower. And, with Leschen you are assured of *higher-than-rated quality* for *longer-than-expected wire rope service.*

Can you use these benefits? To make sure, ask your Leschen man. Leschen makes all types of Red-Strand wire rope for all types of jobs, and can help select the best one for you. Perhaps you *should* use Lang lay. Talk to him soon.

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H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri

HKP

. . . for more details circle 237, page 16

Gravel is

● Marathon County's modern 300 x 70 ft. garage and shop building at Wausau, Wisconsin.

By Lyle Fuller
Marathon County Highway Commissioner
Wausau, Wisconsin

Good equipment helps produce large tonnages required in county's graveling and surfacing program, despite dwindling pit locations and problems of gradation and drainage.

WISCONSIN with its widespread mantle of glacial gravel would seem to be the last place where a county's chief roadbuilding headache is its aggregate supply. Yet aggregates constitute a prime concern in Marathon County, and at least one of the reasons will interest fellow highway people elsewhere, namely, the dwindling supply of readily accessible pits of good quality material. In our county today, we are waging a never-ending search for new pit locations. In many parts no suitable deposits exist; in the Southwestern part some experimental work has been done in drilling, blasting and crushing the hard granite found, but to date this material has proved too costly to produce.

One of our problems is the lack of uniformity in the pits being worked. Most pits are shallow, making it necessary to open up vast areas to secure enough material. The county highway department doesn't purchase pit areas outright, but pays property owners on a cubic yard basis. The current average purchase price is 10 cents per cubic yard.

Our aggregate needs, currently running to about 60,000 cu. yd. per year, are best explained by briefly reviewing our road program. Marathon County with 81,000 population is the state's largest county, its 1,577 sq. mi. representing 1½ times the land area of Rhode Island. Serving the county seat, Wausau (pop. 32,000), paper mills and other industries, and its dairying in which it is the Nation's No. 1 county, is a road network comprising 251 miles of State Trunks, 622 miles of County Trunks, and 1,952 miles of Township Roads.

Focusing on the county trunk system, it is made up of 13 miles of concrete, 375 miles of bituminous mats and 234 miles of gravel and granite surfaces. The bituminous mats range from a single-aggregate type mix, machine laid, to a light turn-over surface on lightly traveled roads. The granite surfacing is a decomposed red granite rock, abundant in the central part in locations workable by shovel to depths of 30 to 40 ft. This material however is not suitable for heavy traffic, particularly during long dry spells, and due to its softness does not make a good bituminous mix.

Severe Climatic Conditions

Our construction and maintenance problems are heightened by adverse soils and extreme temperature variations. Frost to 6 or 7 ft. depth is not uncommon in late winter and early spring. The annual spring break-up of road surfaces varies from occasional spot damage in mild springs to disruption of as much as 80 percent of our mats over several miles in some areas in very severe years. The 1955 spring was one of the severe ones. In some places so-called "sink holes" made the highways impassible.

County Road Problems

Funds for the maintenance and construction of the county trunks are derived from three sources; namely, the state allotment as provided by statute, secondary federal aid, and direct county appropriations. The 1955 budget was set up to include the following items: administration $18,000; maintenance of county trunks $288,900; bituminous mats $125,000; snow removal $120,000; county aid bridges $33,820; highway construction $140,000; bridge construction $17,000; secondary federal aid matching funds $140,000; and a $25,000 contingent fund. Of this total of $907,720, the direct county appropriation was $531,408.

The program for 1955 construction consisted of 20 miles of grading, sand lift and base course; also a similar amount of plant mix, machine laid bituminous pavement and 30 to 35 miles of blade mix mats.

Practically all the grading is done by county forces with three 5 to 7 cu. yd. self loading scrapers (pneumatic tires), one 4-wheel drive motor grader and four track-type tractors which do bulldozing, haul and extra scraper and push-load the other units. Most of the culvert installation is done

Our Key Roadbuilding Problem

with a ¾-yd. truck-mounted trench hoe.

After the grading is complete, contracts are let by the state (for federal aid projects) or the county for the furnishing of sand lift and base courses.

Most of the grades constructed on county trunks are on a right-of-way five rods wide. The grade is built 38 ft. wide on top. With a foundation lift of 10 to 12 in. and a base of 2 to 3 in., the completed roadbed is 26 ft. wide. A 2-in. bituminous mat is then constructed, top soil placed on the exposed lift slope, and gravel or granite shoulders placed to complete the job. Seeding of slopes is done with an ordinary farm grain drill.

Two Portable Plants

The county owns two crushing plants. One plant, a Cedarapids Commander portable, produced material recently in a very troublesome pit. This plant is equipped with 10x 36 in. jaws, 30x25 in. rolls, and a 48 in. x 10 ft. screen. The material was used on two federal-aid projects on county trunks. The plastic nature of this material has made it necessary to cut production to a minimum to meet state specifications — the only alternative since other sources of gravel would mean very long dead hauls (30 miles or more).

The specifications required a single-aggregate, modified bituminous mix using approximately 23.5 gal. per cu. yd. of MC-5 asphalt. The gravel produced had to meet the following screen analysis by weight:

Passing	¾ in.	95-100%
	⅜ in.	65-85 %
No.	10	30-55 %
No.	40	15-35 %
No.	200	3-12 %

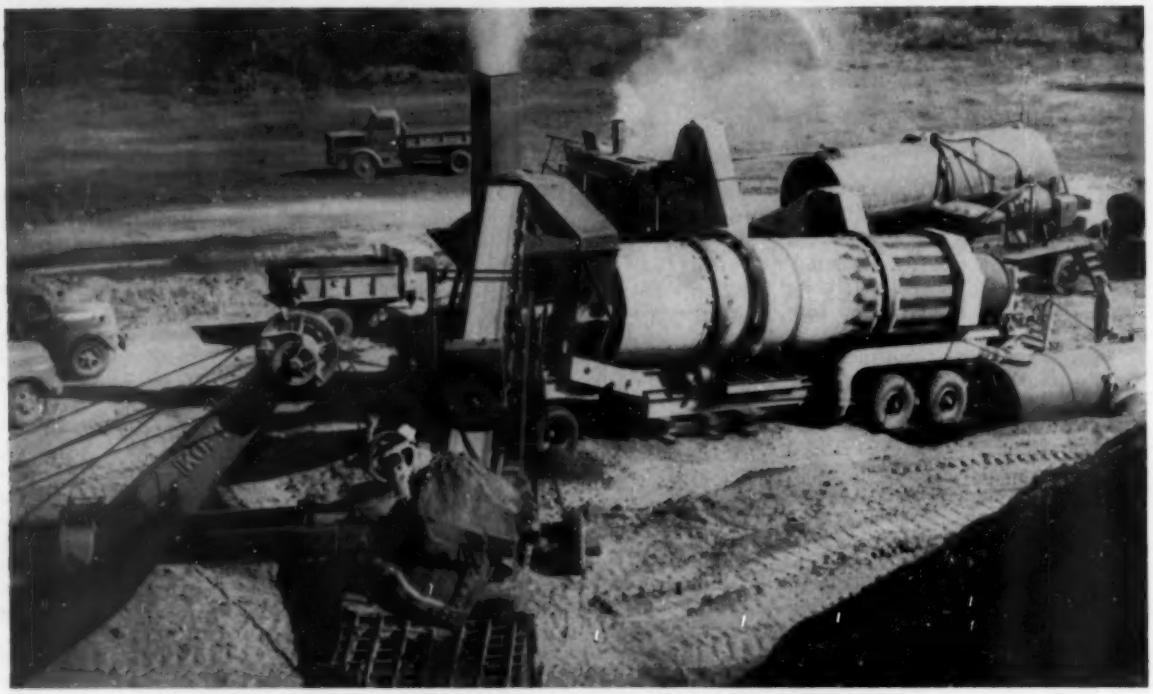
The dryer unit, an 88 x 28 in. Cedarapids, uses low-pressure air burners with an electrically controlled, calibrated feeder between the drier and the mixer. Our mixer is a Cedarapids master mixer with a capacity of 100 to 150 tons per hour. The dryer and mixer were purchased in 1950. The county highway committee is considering making necessary changes to permit use of asphalt cement at higher temperatures.

During the 1954 season about 50,000 cu. yd. of gravel was produced by the two county-owned crushers, and an additional 10,000 cu. yd. was obtained by contract for county trunk work. The production cost for county-produced material varies from 70 to 80c per cu. yd., depending on the amount of stripping and the purchase price.

In addition to the two crushers the highway department owns a breaker, used in granite pits in the gravel-scarce western part, where material for lifts is not easily obtained. We have had excellent results with crushed field stones produced during the open winter months for lift material. The breaker is moved from one large pile to another and the crushed stone (max. size 3 in.) is hauled directly on the highway and is placed in 8 to 10 in. lifts. Either crushed gravel or granite base course is then placed on top to make a good subgrade for bituminous mats.

Our program for the 1955 season fell far behind schedule due to the large amount of repair and maintenance to previous construction of low type with little or no base preparation. We were (at this writing) in hopes that mother nature would be kind and furnish us with a beautiful autumn season, whereby we could operate our crusher and mixing plant into November. We are at this writing employing 120 men on a 50-hour work-week basis, with overtime in prospect.

● Cedarapids Commander portable aggregate plant.



● Dryer and mixer producing one-aggregate asphaltic mix for Marathon County Trunk highway surfacing. Located in pit adjacent to crushing plant.

Major Equipment Owned and Operated by Marathon County (Wis.) Highway Department

1 Diamond Crusher
1 Cedarapids crusher
1 Cedarapids breaker
2 Koehring ¾ c.y. shovels
1 P&H ¾ c.y. shovel (truck mounted)
2 Hough loaders 1&1½ c.y.
2 Galion rollers, 5-7 ton
2 Gunnison asphalt distributors
1 Adams travel loader
1 Cedarapids dryer and mixing plant
2 Seaman Pulvi-mixers
22 FWD large trucks, 21 Wausau snow plows
1 Autocar large truck, 1 Wausau snow plow
35 Trucks (International, Dodge, GMC, Ford)
4 Caterpillar tractors (track type)
1 International tractor (track type)
1 Tournatractor
3 Tournapulls, 5 to 7 c.y.
12 Caterpillar motor graders
9 Galion motor graders
1 Allis-Chalmers motor grader
1 Austin-Western motor grader
3 Adams construction graders
2 Wooldridge 507 c.y. scrapers
Plus numerous smaller pick-ups, station wagons, etc.

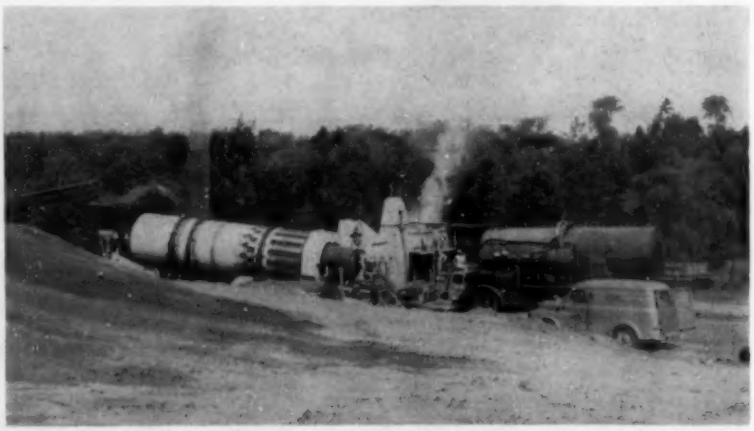
The total value of all equipment and building owned by the highway department on January 1, 1955, was $753,000.

The operations of the Marathon County Highway Department were greatly improved by the installation of two-way radios in 1954. Units have been installed in the patrol superintendents' and engineers' cars; also in three station wagons for construction operations, fuel trucks, 3 large plows and 5 patrol trucks. More units are expected to be added as the need arises. This system furnishes two-way communication between mobile units and the main shop or Commissioner's office, and also serves as an intercom between shop and office.

New York City tries half-hour parking meters

One hundred and sixty-seven parking meters in Lower Manhattan in New York City are being converted from one-hour time limit to 30-min. time limit, according to Traffic Commissioner T. T. Wiley.

A survey showed that one-hour meters were not forcing enough turnover. This coupled with the experience that half-hour meters reduce double parking, facilitate traffic movement, and have a popular appeal, led to this decision.



● Koehring shovel and FWD truck, at work in one of the county's troublesome pits. Another view of the county's dryer, asphalt mixer and related equipment.

The LINE forms on the RIGHT!

For these NEW **PAYLOADER**® tractor shovels

We anticipated some of this demand....

But apparently not enough....

We're increasing our production....

We're expanding our facilities....

However, since these new models outproduce and outperform other tractor-shovels, we expect the demand to increase even more. If you are interested in more production at lower costs, your future needs will probably include one or more of these new "PAYLOADER" models.

Because of the current demand we suggest you contact your "PAYLOADER" distributor *at once* and discuss your needs with him.

These new models have been designed and are being built by The Frank G. Hough Co. who introduced the first four-wheel-drive tractor-shovel and who have produced more unit-design tractor-shovels than all other firms put together.

model HU *1 cu. yd.*

model HH *1½ cu. yd.*

model HO *2 cu. yd.*

The complete proven "PAYLOADER" line of tractor-shovels includes sizes ranging from 18 cu. ft. to 2 cu. yd. bucket capacity and available in four wheel drive, rear wheel drive and front wheel drive types. They are sold and serviced by the largest, most experienced Distributor organization in the business.

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MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
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768 Sunnyside Ave., Libertyville, Ill.

Send information on "PAYLOADER"
☐ model HU ☐ model HH ☐ model HO

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Title.....
Firm.....
Street.....
City.....
State.....

. . . for more details circle 216, page 16

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with 33-1/3% more guaranteed 'cut-ability'!

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33⅓% more efficient cutting time to the maximum you are now getting with conventional diamond blades –

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THE ANSWER:
You have it . . . MONEY IN YOUR POCKET! . . . SAVINGS! . . . Real honest-to-goodness EXTRA PROFITS, with dependable, KING SIZE CARDINAL DIAMOND BLADES, made by men who know the blade business.

Try a CARDINAL DIAMOND BLADE on *your* cutting job. Call or wire today, advising make of saw, size required, and material to be cut. Then . . . hold your hat for astounding results!

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Cardinal DIAMOND BLADES for wet cutting are hardened, tempered and tensioned to proper operating speeds. Segments are individually molded to assure diamond uniformity, and are guaranteed not to come off in normal use.

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World's Largest Exclusive Manufacturer of Masonry Blades
Distributors in Principal Cities

Aluminum Armor Used for Piles at Water Level

DESTRUCTIVE marine organisms, the enemy of wooden pilings, have met their match in corrosion-resistant aluminum. Of interest to highway engineers and contractors is a recent installation of aluminum jackets for pilings at the Todd Shipbuilding Docks, Pelican Island, Galveston, Tex., where 250,000 lb. of aluminum is being applied to 1500 pilings.

This application is the result of experimental installations made by Aluminum Company of America at Pensacola, Fla., and in the Hudson River near the New Jersey area. Examination of the jacketing at Pensacola after 15 years' exposure showed it to be in excellent condition.

The piling jackets installed at Galveston are being manufactured by Childers Manufacturing Company of Hudson, Tex. and put in place by the Tellepsen Construction Company on contract from the U. S. Navy.

The casings are made of .051 in. thick 5050 Alcoa aluminum coiled sheet. They are fabricated in half cylindrical sections about five feet long which are placed around the pilings and locked together to form a complete protective covering. Patents covering this general type of installation are held by the W. Horace Williams Company of New Orleans. Actual design of the jackets, particularly the method of securing them, was developed by Childers Manufacturing Company in conjunction with engineers at Tellepsen Construction Company and Aluminum Company of America.

Each section has stovepipe-type crimping at the end so that the lengths can be joined together without the use of screws or other fastenings. Locking strips overlap the joints to provide continuous strength, and spacer clips assure proper spacing between the aluminum and the wooden piling.

Sections of the casing are installed from a raft at water level. As sections are added, the entire assembly is lowered until the bottom end is imbedded into the ocean floor. A mixture of asphalt and sand is poured into the space between the aluminum jacket and the pier piling, thus forcing the water up and out at the top. This mixture provides an excellent barrier and heal between the casing and the pile.

It is estimated that the aluminum jackets will add 20 years to the life of the pilings, by protecting the wood from erosion, marine growth and the harsh salt content of the water.

Yield signs tested in California city

The new type of sign reading "Yield Right-of-Way" is being tried out on an experimental basis in many communities today. Typical of these is Oxnard, California. According to Chief of Police C. T. Hartmeyer, Oxnard recently installed four such signs.

The purpose is to slow down traffic at certain intersections where it is felt that a complete stop is not necessary. This applies especially to residential areas where caution should be observed on semi-blind or blind corners.

As explained by Chief Hartmeyer, as the driver enters an intersection with the "yield" sign, he should slow to 15 mph and be prepared to yield to all other cars. He feels that this tends to make the driver more aware of the need for caution, even though stopping is not necessary. "However, in my opinion," he said, "the yield signs should not, and could not, replace actual stop signs installed at heavily trafficked intersections where a complete stop is necessary."

The signs are triangular shaped, 33 inches on each side, and are installed at the same height as regular stop signs.

In California the problem of enforcement involves a legal question, since the signs are so new that the California Vehicle Code has nothing to say on them. Actually the enforcement problem is simple, because vehicles must yield right-of-way when entering posted intersections.

No accidents have occurred during the four months on any of the four corners where the "yield" signs have been installed — an encouraging progress report thinks Captain Hartmeyer.

● Frank J. Rooney, Miami building contractor, has been named to head the 1956 officer slate of the Associated General Contractors. After December balloting of members, officers will be inducted at the association's annual convention, New York, February 13-16.

Lester C. Rogers, president of Bates & Rogers, highway and heavy contractors, Chicago, is vice-president nominee.

● A corrosion-resistant aluminum jacket being placed around a pile at Galveston, to protect against marine organisms and sea water.

Plans Mapped for Big ARBA Road Show in Chicago

PLANS for the 1957 American Road Builders' Association Annual Convention and International Road Show are developing fast. Preliminary arrangements for the Show, which will exhibit all types of heavy construction machinery, were worked out by representatives of ARBA and CIMA (Construction Industry Manufacturers Association) in September.

The most spectacular indoor exhibition of its kind ever held will draw tremendous throngs to the enlarged Chicago Amphitheater from Jan. 28 to Feb. 2, 1957. Space exceeding 300,000 sq. ft. will be devoted to the equipment display. Delegates from every State and from most foreign countries, representing all branches of government and industry, will participate in the brilliant Convention program to be offered by ARBA and in the special activities of the Road Show.

A full scale informational program on the Road Show will get under way in the early months of 1957.

The special liaison CIMA committee, to coordinate the Road Show program, is headed by Harvey A. Scribner of the Russell T. Gray, Inc., advertising firm in Chicago. Serving with him will be J. E. McCracken, Bethlehem Steel Co. and Donald O. White, American Asphalt Paving Co., both representing ARBA. In addition, the liaison committee will include C. E. Stevens, International Harvester Co., representing the International Road Federation, and Paul B. Reinhold, Atlas Equipment Corp., representing the Associated Equipment Distributors.

A special CIMA Working Committee for the Road Show, also headed by Mr. Scribner, includes: Publishers E. E. Weyeneth, *"Construction Methods & Equipment;"* D. V. Buttenheim, *"Contractors & Engineers;"* G. L. Anderson, *"Construction Bulletin;"* J. D. Bowler, *"Southwest Builder & Contractor;"* and G. C. Stewart, *"Constructioneer."*

Representing advertising agencies are A. W. Lehman of Richard T. Brandt, Inc., and H. K. Kenyon of the Andrews Agency.

Advertising managers on the committee include: J. W. Brown, Detroit Diesel Engine Division; Don Fricker, The Heil Co.; M. B. Jaeger, Bucyrus-Erie Co.; Lloyd Rager, Le Tourneau-Westinghouse; J. M. Gates, The Galion Iron Works & Mfg. Co.; and W. A. Rundquist, Pioneer Engineering Works.

ARBA's representatives on the CIMA Working Committee will include Burton F. Miller, deputy executive vice president and R. L. Smith, director of public relations.

Ex officio members named to the committee are Kenneth Lindsay, executive vice president, Iowa Manufacturing Co., president of CIMA; Julien R. Steelman, president of The Koehring Co. and chairman, Joint ARBA-CIMA Road Show Committee; and Harold F. Hess, executive vice president of CIMA.

● Burton F. Miller, deputy executive vice president of ARBA.

Radar control reduces Texas road fatalities

Highway departments struggling to design roads that will help bring about lower fatality rates from traffic accidents will be interested in the effectiveness of radar speed control on the Texas highways. Fatal accidents on the main highways of Texas decreased 6 percent during the first 8 months of 1955 compared to a comparable period of 1954. D. C. Greer, state highway engineer, reported that a staff study has revealed a decline in speeding. Using radar machines at 24 locations on main Texas roads, Greer's staff found that 12 percent of the motor vehicles exceeded the 60-mph legal speed limit compared to 17 percent last year.

Director of public safety, Homer Garrison, Jr., working in conjunction with the highway department, credits radar machines with helping control drivers.

Rusch named director of national urban committee

W. A. Rusch, Assistant to the City Manager, Kansas City, Mo., has been appointed Staff Director for the National Committee on Urban Transportation. New headquarters for the Committee will be located in Washington, D. C.

Rusch, 37, is a native of Wisconsin. He holds B. S. degrees in Landscape Design from the University of Wisconsin and in Town and Regional Planning from Iowa State College.

He served three years as Senior Draftsman with the Planning Division of the Chicago Park District. In 1950 he was appointed Associate Planner with the City Plan Commission of Kansas City and was promoted to Senior Planner two years later. Since 1953, Rusch has served as administrative assistant to L. P. Cookingham, City Manager. During the past five years he has had considerable experience in planning for the transportation needs of Kansas City.

During World War II he served as a Captain in the Corps of Engineers. Rusch succeeds Norman Kennedy who served the Committee for one year while on leave from the Institute of Transportation and Traffic Engineering of the University of California.

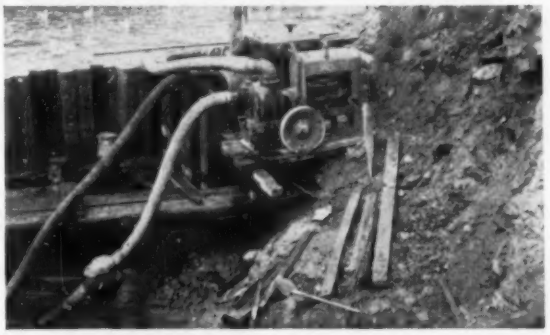
Overtime compensation

Under Sec. 7(f)(3) Fair Labor Standards Act, employers and employees may arrive at an agreement to compute overtime pay on "basic rates" rather than regular rates ordinarily applicable. Briefly, a few of the rules are: (1) Overtime compensation must be paid after private or collective bargaining before the work is performed. (2) The rate established must be the basic rate. (3) The established basic rate must be a specific rate or one which can be derived by a specific method of calculation. (4) It must meet the minimum hourly rate specified by law. (5) The basic rate must be authoried as being substantially equivalent to the average hourly earnings, exclusive of overtime, in a particular work over a representative period of time. (6) Overtime hours must be paid for at time and one-half the basic rate.

Five categories of basic rates are authorized for special situations and the employer may apply for approval of other basic rates. The new regulations are effective on September 5 and copies may be obtained from the Wage and Hour Division: "Rules & Regulations Amended, July 29, 1955." — *Virginia Road Builders Association.*

Jaegers prime faster, pull stronger, pump longer

SLOW PUMP SPEED HANDLES FAST WATER — Latrobe Construction Co., had to pave the slope of Loyalhanna Creek with 8" thick concrete 25' wide (equivalent to highway slab) when relocating U.S. 30, western Pennsylvania. This Jaeger 6P pump handled 1500 gpm of inflow at a speed of 1450 rpm. Ordinary 6" pumps, with smaller shells and impellers, require up to 1750 or 1800 rpm.



JAEGER PUMPS MAKE WET JOBS DRY — Two 4" and three 6" Jaegers were used to dewater the main pier cofferdam on this Milwaukee River bridge. Conservatively rated, they have capacity to dewater fast and sure-priming ability to keep jobs dry.

NEVER RACES TO PRIME — There's reason why this Jaeger 3P pump is being used to control seepage in this tremie sealed cofferdam on Frederick Snare Co.'s Raritan River Bridge job, N. J. Wherever priming is a problem, Jaeger's combination of inherent and jet priming actions, greater priming water capacity and ability to prime without racing the engine are valuable advantages.

PUMPS ALL THE WATER A 2" HOSE CAN HANDLE — This Jaeger hi-performance 2" pump delivers its full rated capacity of 10,000 gph when operating at only 2400 to 2550 rpm (as much as 400 rpm below the speeds of similar ordinary pumps). 28" vacuum at the intake flange is not unusual. Weighs only 180 lbs., measures only 24" x 21" x 26" high, as shown. On base, weighs only 160 lbs.

For complete information on Jaeger pumps from 1½" to 10" in size, see your Jaeger distributor or send for Catalog P-4.

THE JAEGER MACHINE COMPANY

223 Dublin Avenue, Columbus 16, Ohio

COMPRESSORS • LOADERS • TRUCK MIXERS • CONCRETE MIXERS • PAVING MACHINES

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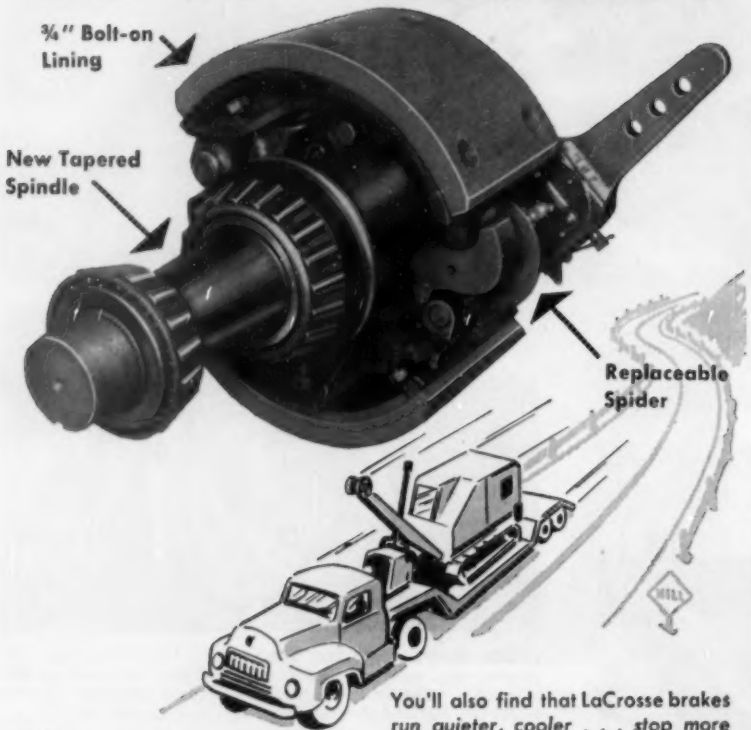
BIGGEST

Safest Brakes on 15" wheels!



When you have to STOP a heavy trailer load barreling down a steep grade, that *EXTRA 52 sq. in. of braking surface* you get on a LaCrosse tandem axle trailer, can mean the difference between life and serious injury — to men and to the equipment being hauled!

Remember, every LaCrosse-engineered trailer brake measures 12¾" x 6" wide — ½" *wider than any competitive lining used with 15" tires.* This means 13 sq. in. more lining per wheel — 52 sq. in. of extra safe braking area on every LaCrosse 4-wheel trailer.

You'll also find that LaCrosse brakes *run quieter, cooler . . . stop more smoothly.* Reason? Special exclusive S-cam design, with worm-gear slack adjusters and direct chamber-to-axle mounting. Linings are tough ¾" bolt-on type, which *outlast ordinary lining 45%,* according to owner records. In addition, LaCrosse now gives you removable bolt-on brake spiders, for quick, economical field replacement as needed—another important advantage found only on LaCrosse.

For free literature describing ten other exclusive LaCrosse advantages, write: LaCrosse Trailer Corp., Gould St., LaCrosse, Wis.

LC-33

LaCROSSE

America's Favorite **LOW-BED TRAILER**

. . . for more details circle 235, page 16

New Publications

Tests on large culvert pipe

TESTS ON LARGE CULVERT PIPE. Circular 269, Highway Research Board. Contains two papers presented at the Board's annual 33rd meeting.

"Tests of Large-Diameter Reinforced Concrete Pipe" by John C. Hendrickson, Jr., covers a number of tests on 84-in. pipe. Various systems for reinforcing the pipes were used, including standard type normally used in pipe production. It was found that, if special reinforcement is provided to take care of shearing stresses, the strength of the tension reinforcement can be used more effectively and that crushing strength can be greatly increased without increase in wall thickness.

"Deflections of Timber-Strutted Corrugated-Metal Pipe Culverts Under Earth Fills," by M. G. Spangler and Donald L. Phillips, presents an analysis and development of a formula for predicting the vertical and horizontal deflection, or change in diameter, of timber-strutted corrugated-metal-pipe culverts. In the analysis, the strutted pipe is considered to be a composite elastic structure in which the vertical deflection of the pipe is the same as the deformation of the timber strut. The deflection of the pipe is determined by the curved-beam theory and equated to the expression for strut deformation. Results indicated by the developed formula are compared with the performance of an 84-inch-diameter "improved multiplate" pipe under a highway embankment 137 ft. high above the top of the pipe.

Price of bulletin $0.45, remitted to Highway Research Board, 2101 Constitution Ave., Washington, D.C.

LEGAL CASES FOR CONTRACTORS, ARCHITECTS, AND ENGINEERS, By I. Vernon Werbin. 453 pages. McGraw Hill Book Company, 327 W. 41st St., New York 36, N. Y.

This is the third volume prepared by Mr. Werbin, noted engineer and attorney, for helping engineers and architects with legal problems encountered in their professional work. The legal cases cover 52 additional situations, including some recent ones on subjects discussed in previous vol-

umes. Some of the problems covered: Right to vary the quantities of work called for by original plans and specifications; liquidated damages for delayed performance; admissibility of oral evidence to show that a written contract was not to take effect until a future event took place.

SOIL DENSITY AND STABILITY, Bulletin 93. This bulletin of the Highway Research Board gives evidence that engineering knowledge on the densification of soil, and the effect of densification on behavior of soils, continues to increase rapidly. A paper by Chester McDowell describes a realistic method for selecting densities which can be attained under practical construction methods.

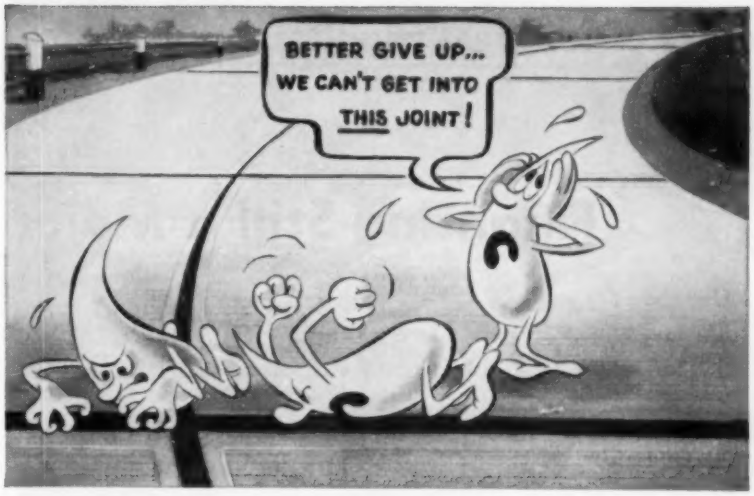
Two papers present data to show not only how the limitations in density, water content, and degree of saturation influence stability but also how stability and swelling characteristics of soils are influenced by method of compaction. Those papers are "Relationship Between Density and Stability of Subgrade Soils," by H. B. Seed and C. L. Monismith, and "Effect of Campaction Method on Stability and Swell Pressure of Soils," by H. B. Seed, R. Lundgren, and C. K. Chan.

The most efficient compaction method is that method which requires the minimum number of applications of load and yet produces the required amount of work to densify the soil to meet requirements, according to a paper by G. F. Sowers and C. M. Kennedy, "Effect of Repeated Load Applications on Soil Compaction Efficiency."

The practicability and usefulness of the density method for specifying and controlling compaction has been further increased by the development of the Washington Densometer, described in "New Method for Measuring In-Place Density of Soils and Granular Materials," by C. E. Minor and H. W. Humphres.

For copy of Bulletin 93, address Highway Research Board, 2101 Constitution Ave., Washington 25, D.C.

AMERICAN TRUCKING TRENDS. Profusely illustrated with graphs and charts, a booklet by this title has been issued by the American Trucking Associations, Inc., giving much valuable data on the trucking industry and the use of trucks over the highways. Available by writing the above association at Washington 6, D. C.



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...and keep water from getting under your pavements!

Count on this popular rubber-asphalt compound to keep your concrete road joints free from costly water seepage. Year after year. Without re-pouring.

Flintseal stays extensible and compressible through all weather . . . through expansion and contraction of slabs. It won't crack in cold . . . won't flow in heat. Bonds firmly . . . to keep water and dirt out of joints.

Flintseal (hot-poured), Flintseal JFR (jet-fuel-resistant) and Flintkote Cold Poured Sealers meet state and federal specifications. Accept nothing less than these rubber bearing joint-sealing compounds for positive long-lasting sealing, and economical maintenance.

Ask for literature and application data for roads, streets and airfields.

You find Flintseal is *super* for super-highways. One application lasts for years and years.

Flintseal bonds to joint walls perfectly. Keeps pavement maintenance costs down.

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. . . for more details circle 201, page 16

Financing Still a Major Problem

That public officials are constantly striving to do a better job; that they derive considerable benefit from mutual discussions and inspection of the latest developments in new equipment, is indicated by the all-time record registration of 1,456 at the annual APWA Congress held in Milwaukee the first week in October.

ALTHOUGH the program followed no particular theme, several central problems persistently came up in forums and question tables:

One subject inevitably was finances.

Another: citizens demand more and better services.

Still another is the demand for relief of traffic congestion in urban areas, calling for expressways, better streets, improved traffic control and better transit service.

The taxpayer wants many other things: more frequent refuse collection and street sweeping. He objects to puddles in the street in front of his house so he petitions city hall for storm sewers, and curb and gutter. He doesn't want his child going to school in the afternoon on the second shift. He wants a policeman to pass his house every fifteen minutes.

All of these and many more things he wants, even demands, but does not want his taxes raised to pay for them.

The individual public employee, be he department head or foreman, can do little about this problem, was the concensus, but several forums indicate a continued trend toward adopting the practices of private business to government operations at the local level.

Excerpts from a few of the many papers and discussions are given in the following:

● *Equipment Procurement.* R. P. Berry, deputy purchasing agent, Department of Purchases, Contracts and Supplies, Chicago, Ill., points out that all too often equipment is purchased on the basis of the low bid on specifications that may have been copied directly from a dealer's catalog, thus eliminating competition. In other cases states Berry, some equipment is manufactured solely for the purpose of bidding on government purchases.

To remedy this condition the practices followed by big industries in evaluating equipment and machinery should be adopted, according to Berry. Two methods can be adopted readily; quality description or performance type specifications or a combination of the two. Selection of the equipment to be bought would be based on an evaluation formula which would take into consideration a variety of factors, including operating cost, cost of parts, ease of servicing, and in general those things a contractor considers when he purchases equipment in the open market for a specific end use.

● *Construction Contract Administration.* Milton F. Wagnitz, city engineer, Detroit, Mich., speaking on contract documents admitted that there probably never has been or will be a perfect set of contract documents, but that disputes and controversies may be minimized by more careful preparation of construction contracts.

Wagnitz pointed out that to have a "meeting of the minds" a clear understanding and agreement between the two parties must exist as to just what is included in and what the requirements are of the contract. "For a governmental construction contract this would mean, among other things, that the detailed drawings and specifications must clearly show and describe just what is intended and required, and could not be simply general to the point of being vague or ambiguous." He further emphasized that the contract documents, including the specifications and all drawings, become important from a legal standpoint, besides defining and showing the technical engineering and architectural requirements.

Wagnitz emphasized the importance of keeping contracts in simple readily understandable language, particularly the specifications in order that they may be correctly interpreted by everyone on the job including the foremen and skilled workmen. He recommends the elimination of stereotyped phrases which obscure the real meaning such as: "best quality;" "reasonable;" "to the satisfaction of the engineer;" "as indicated on the drawings (the drawing is part of the specifications);" "the contractor shall provide all material and perform all labor;" "in accordance with these specifications."

Wagnitz stressed the considerable difference between public contracts and those between private owners and contractors. Generally, public con-

● Warren A. Coolidge, retiring president of American Public Works Association, presents gavel to successor, Edward P. Decher.

struction contracts must be awarded on the basis of the low bid, therefore, the complete scope of the work must be in sufficient detail that there will be no misunderstanding. On private contracts, the owner for business or personal reasons may award the contract to anyone of his choosing without competition and he is not hampered by regulations in making changes on the job; for this reason the plans and specifications may be considerably less detailed.

Two outstanding recommendations made by Mr. Wagnitz are quoted here:

"The specifications should not attempt, by the use of general face-saving requirements, to place upon the contractor the responsibility for inaccuracies of statements made or incorrect drawings. Neither should the contractor be made liable for omissions on the basis that the contract contemplates complete and finished work.

Further, the contractor cannot be minutely directed as to how he must perform certain work and then be held responsible for obtaining specific results. The documents may specify either the method of doing the work or the result required, but not both."

Mr. Wagnitz emphasized that the time and effort devoted to proper preparation of clear and concise contract documents, specifications and working drawings will result in lower construction costs by eliminating the uncertainties for which bidders often added a sizable contingency to their bid.

● A section in APWA equipment show, Milwaukee City Auditorium, Oct. 2-5, 1955.

● *Award Procedures.* In a paper on award procedures, Henry D. Harral, street commissioner, Philadelphia, outlined the city's requirements for prequalification of bidders, performance rating of contractors and the benefits of these requirements. He stressed the poor public relations aspect of controversies that can arise when a contract is not awarded to the lowest "qualified" bidder.

Harral reiterated the basic principles of clear concise proposals previously laid down by Wagnitz. He pointed out that the Joint Committee of APWA and AGC spent considerable time in developing the Uniform Public Works Engineering Construction Forms setting forth the basic items to be included in an invitation to bid.

While admitting that the word "responsible" covers such conditions, the city includes the following statement with the invitation:

"Bidders will be required to show to the satisfaction of the Commissioner that they are responsible and capable of performing the work to be done under the contract, that they have successfully completed contracts equivalent in scope and comparable in magnitude, and that they have the necessary financial resources to perform the work in a proper and satisfactory manner, in accordance with the Contract Documents, and within the time specified.

"Informal Proposal — A proposal which is incomplete, obscure, conditional, or unbalanced, or which contains additions not called for, or irregularities of any kind, may be rejected as informal. A proposal which contains alterations, erasures, or is not accompanied by the required certified check or certificates of deposit or bonds of the City of Philadelphia, shall be rejected."

● *Bidder Qualification:* Rather than require that the bidder qualify with his bid, the city of Philadelphia includes with the Instructions to Bidders a form with the following instructions:

"Each bidder will be required to submit to the Commissioner, not later than one week prior to the time of opening of bids, a sworn statement of his facilities, experience, and financial resources, upon the Department's questionnaire form for the purpose of determining his qualifications and responsibility. Should the information so required be refused or omitted to be given, or should it, in the judgment of the Commissioner, reveal that the prospective bidder is not sufficiently equipped or qualified to enter into or perform the said contract, no bid from such bidder or bidders will be received or scheduled, and the Commissioner will forthwith notify the proposed bidder to that effect."

In the department of streets considerable information is required as to equipment, source of supply of asphalt, concrete and other materials. Each questionnaire is carefully reviewed unless the contractor has established over a long period of years a reputation for completely satisfactory performance. Even in this case his work load is carefully examined.

The department also maintains a record of jobs under construction for each contractor. If a contractor is

New APWA Officers for 1956

President: Edward P. Decher, secretary of the Joint Sewer Commission of Newark, N.J. (succeeding Warren A. Coolidge, Nashville, Tenn.)

Vice Presidents: Kenneth K. King, director of public works, Phoenix, Ariz., (reelected); Frederick W. Crane, general manager, Buffalo Sewer Authority. Holdover vice presidents are Walter M. Swietlik, commissioner of public works, Milwaukee; and Albert G. Wyler, director of streets, New Orleans.

Treasurer: Robert L. Anderson, superintendent of public works and village engineer, Winnetka, Ill.

Directors: Jean L. Vincenz, director of public works, San Diego County, Calif., and Sol. Ellenson, director of public works of Newport News, Va. (two years). Continuing members: W. D. Hurst, city engineer, Winnipeg, Man., Canada; Roy W. McLeese, city engineer, Salt Lake City, Utah.

At the APWA Equipment Show

Some seventy exhibitors displayed, and in some cases demonstrated the latest developments in equipment and materials. Major and minor improvements in equipment are directed toward increased operating efficiency and lower operating costs. Greater use is being made of torque drives, automatic transmissions and hydraulic operation. Many manufacturers continue to develop multi-purpose equipment, which is particularly attractive to the small contractor and city that cannot afford to buy a piece of equipment for a few limited operations.

loaded to his limit with prior jobs he may be rejected as unqualified for all or part of the coming letting. Later if his work load drops he is reinstated as qualified.

Harral points out that the chief advantages of their system of prequalification are: relieves the heat and tension if a weak bidder is the low bidder; reduces the chance of award holdups and court action by disgruntled low bidders who are rejected; saves the disqualified contractor the time and expense of bid preparations.

In two years only two cases have been appealed to the Commissioner by dissatisfied applicants. One was denied; the second was quickly settled by agreement between the chief engineer and the contractor for yes on one proposal and no on another.

Supplementing prequalification, each section and division head is required to fill out a "Contractors Performance Rating" for each project. Space is provided for statements of delays and reasons therefore, correction of defective workmanship or material, and manner of general performance. Unsatisfactory ratings are passed on to other sections and to other departments.

• *Inspection and Testing:* Speaking on this subject W. T. Anderson, inspector of public works, Los Angeles, stated that it was ill-advised to place poorly qualified representatives of the owner on field inspection, rather than selecting a man experienced in the type of construction being undertaken. While an unqualified man may meet the legal requirements, the owner runs the risk of getting poor or defective work, which may not show up until several years later.

The on-the-job representative of the city can serve as an excellent public relations man for resolving problems that arise in connection with construction in built-up areas. This is particularly true in areas where business may be disrupted by construction, a dust problem is created or work appears to be moving slowly. Many times the inspector in the field may be able to explain to a disgruntled property owner, why the job is not under way or why it is necessary to follow certain procedures, thus forestalling complaints to city hall.

Mr. Anderson stressed the importance of continuous and thorough materials testing, not only at the job site; but at the source. The City of Los Angeles also conducts extensive tests on new materials as they appear on the market.

• *Utility Cuts:* L. P. Staman, director of public works, Tacoma, Wash., estimates that if only one pavement cut per day per municipality is made and the replacement is worth $10, the annual bill for utility cuts in the United States amounts to $61,000,000. He pointed out that with the rapid expansion of many cities and the expansion of metropolitan areas, that every utility, both public and private are battling for underground space. To eliminate future headaches as far as possible, he recommends close coordination between cities and utilities, with emphasis on future planning. Permits for pavement cuts should be tested in one central authority to provide coordination and to prevent interference with future plans.

Awards at APWA Congress

Robert L. Anderson, superintendent of public works and village engineer of Winnetka, Ill., received the Charles Walter Nichols Award consisting of an honorarium of $500 and a scroll describing his achievements. For outstanding leadership in the field of municipal sanitation.

Melvin Jack Shelley of Vancouver, B.C., was named the first recipient of the Engineering News-Record $1,000 fellowship for advanced study in the field of public works, engineering and administration. The citation: "in recognition of his demonstrated technical abilities, on-the-job performance (while with city of Vernon, Canada), desire and scholastic capacity for graduate study and personal qualities particularly fitting for a career in public service."

John A. Morin, superintendent of streets and ex-officio city engineer, Oakland, California discussed regulation and enforcement of street cuts. He pointed out the serious public relations problem in connection with cuts which remained open and methods of enforcing compliance with the terms of permits and specifications. Morin praised the work of the Northern and Southern California Chapters of the APWA and contractors and utilities companies in developing a manual on Surface Traffic Interference. In Oakland, study of this manual is mandatory for all inspectors and foremen. The booklet illustrates the right and wrong way to place barricades and spoil banks, and points to the traffic congestion that can be caused by poor planning. It emphasizes that the installation of a service line or side sewer is not an unskilled task, but actually calls for skillful planning and judgment.

In Oakland, practically all of the service lines are installed by jacking or boring methods. Water and gas mains up to 6 in. in diameter are being installed by drilling and jacking, with pits as far apart as 200 to 300 ft.

Unionization push continues

The A.F.L., notes a bulletin from the Virginia Road Builders Association, has already begun a drive to extend the effect of the Davis-Bacon Act by amending the law to require the wage rates to be set on a nation-wide basis rather than by the present area-by-area basis. This, the bulletin reminds, will apply only on federal contracts unless the unions succeed in their effort to have all construction involving any federal funds include the Davis-Bacon Act as part of the law. In this case, it could apply on schools, highways, airports, etc. The unions also announce that they will push for a new minimum wage level of $1.25 when Congress reconvenes.

Meanwhile, observers the bulletin, the fight goes on for supplemental unemployment payments in many of the basic industries. These payments work as a supplement to unemployment compensation benefits and result in a "guaranteed annual wage" for the employee. Economists report an increase of 5 percent to 6 percent over a year ago. Of particular interest is the fact that the average hourly earnings in building construction may top out to $2.70.

• A. O. Torgerson, former District Engineer, has been appointed Assistant Commissioner of Highways for the Minnesota Department of Highways.

Announcing the Zephyrcranes

A NEW complete line of advanced-design Truck-Cranes

The new Link-Belt Speeder line of truck-mounted Zephyrcranes features Speed-o-Matic — the true power-hydraulic control system. Fingertip-operated, it provides fast, easy, positive response, perfect "feel" for speed with accuracy. And because it greatly reduces operator fatigue, keeps him alert . . . you increase safety, and your operator is able to maintain greater output with less effort.

Check these features

- **REVERSING CLUTCHES** are available for either or both main drums . . . provide power load lowering of main hoist line and jib whip line.
- **THIRD DRUM** available for HC-88, 98, 108 is particularly valuable for piledriving applications.
- **ALL CLUTCHES ARE INTERCHANGEABLE** (within each model) with exception of front drum reversing clutch on the HC-58 and HC-68.
- **HIGH-SPEED, INDEPENDENT BOOMHOIST** with power raising and power controlled lowering through Speed-o-Matic boomhoist and lowering clutches is standard on HC-88, HC-98 and HC-108. Available for the HC-58 and HC-68.
- **PATENTED RETRACTABLE HIGH GANTRY** is quickly raised or lowered under power. In raised position, it reduces stresses on boom and boomhoist cable. Standard except on HC-58 and HC-68.
- **FULLY CONVERTIBLE** to standard attachments.
- **REMOVABLE REAR OUTRIGGER ASSEMBLY** permits easy, quick changeover for shovel, hoe or dragline operation.
- **COUNTERWEIGHT REMOVAL DEVICE** using Speed-o-Matic hydraulic jacks, speeds removal and installation of counterweight. Available on HC-88, HC-98 and HC-108 models only.
- **HYDRAULICALLY CONTROLLED SWING BRAKE** is standard on HC-88, HC-98 and HC-108.
- **SCREW-TYPE OUTRIGGER JACKS AND PONTOONS** available.
- **TORQUE CONVERTER** power units available.
- **REMOTE CONTROL** available on HC-68 only.

For details, contact your distributor or write

LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa

HC-98 Zephycrane with 80′ boom and 20′ jib works quickly, spots loads gently, accurately. Operator has clear, up-front visibility.

LINK-BELT SPEEDER

Builders of a complete line of crawler and rubber-tired shovel-cranes

13,000

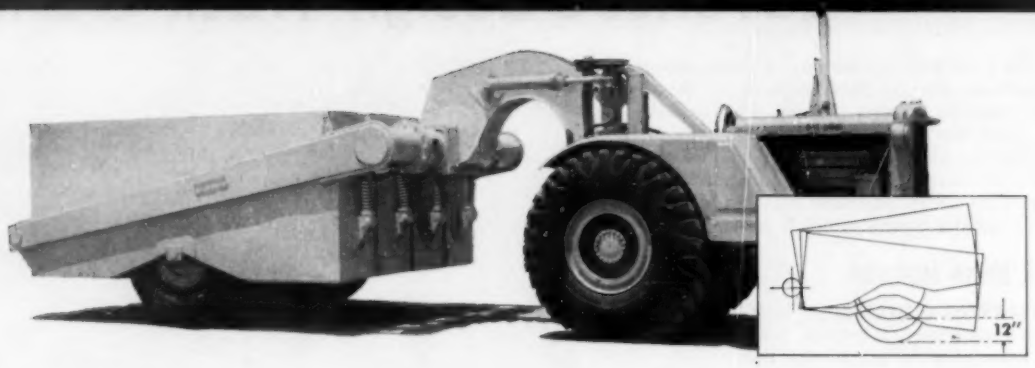
Five models 12½ to 35-ton capacities with true power-hydraulic control

HC-58	HC-68	HC-88	HC-98	HC-108
12½-ton	17½-ton Remote control available.	25-ton	30-ton	35-ton

. . . for more details circle 239, page 16

for compacting earthfills

SELECT SOUTHWEST



Southwest compaction roller

5 SIZES WITH WEIGHT CAPACITY FROM 10 TO 100 TONS

ADAPTER FLANGE permits change of draft beam to suit any tractor.

FEATURING:

1. Greater wheel oscillating freedom with each wheel mounted in an independent weight box unit.
2. Heavy duty, reinforced gooseneck and sectionalized hauling yoke.
3. Swivel hitch with Timken roller thrust bearing.
4. Each wheel equipped with two large Timken bearings.
5. Sectionalized hauling yoke permits use of 2 to 6 wheel units.

Southwest sheepsfoot roller

Simply drive off the old tips and drive on the new tips on the job—no welding required.

HEAVY DUTY MODELS FEATURING:

1. Full oscillating double drums.
2. Timken roller thrust bearing at oscillating pins.
3. Two-piece foot with replaceable tips—permits changing size or replacing tip in the field without welding.
4. One-inch steel drum shell.
5. Heavy duty, reinforced box steel frame.
6. Large swivel hitch with Timken roller thrust bearing.

11 SIZES WITH WEIGHT CAPACITIES FROM 5 TO 20 TONS

WRITE TODAY for illustrated folders giving complete data and specifications.

Southwest Welding & MANUFACTURING CO.
CONSTRUCTION MACHINERY DIVISION
ALHAMBRA, CALIFORNIA

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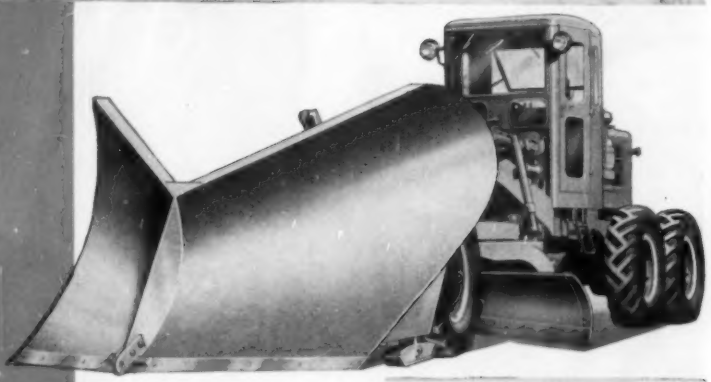
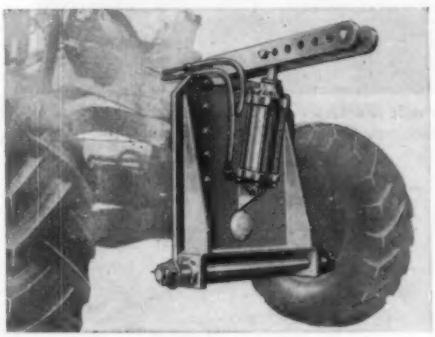
HEAVY DUTY "V" TYPE SNOW PLOWS FOR GALION MOTOR GRADERS



Correctly designed to keep the snow moving smoothly off the plow, and to reduce dead weight and resistance to an absolute minimum. Sturdily constructed and braced for heavy-duty service. Extra-rugged and rigid push plate. Renewable cutting edge of high carbon steel.

The GALION "V" Snow Plow is independently operated by the hydraulic system of the grader, and is controlled from the cab. It is not connected to scarifier lift. Sliding shoes (with renewable wearing plates) prevent plow from digging into the road surface.



MOUNTING BRACKET

For attaching "V" plow to grader. It is a completely assembled unit and is quickly and easily attached to any Galion grader head block. Includes a hydraulic cylinder for independent operation of the snow plow.

SNOW WINGS

Used in combination with a "V" Snow Plow, the GALION Snow Wing facilitates snow removal from road shoulders, and is a great help in cutting down high snow banks and snow drifts. When used in conjuction with regular grader blade (without "V" Plow) the Snow Wing is an effective means of removing medium depth snow and casting from 12 to 20 ft., depending on angle of blade. Wing is independently operated by separate hydraulic pump.

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Job and Equipment Ideas

● Close-up view of compressor-generator unit illustrates space saving hook-up by which one motor drives two machines. Capacity of engine is sufficient to drive either or both units at once.

One motor does it all on this service rig

When Bill Sorenson, Master Mechanic for Ball & Simpson, contractors of Berkeley, California, selected the service equipment to crowd onto a GMC flatbed, he decided on an unusual space-saving arrangement.

First, he put the air receiver tank directly behind the cab. Above this, he mounted a Continental 4-cylinder engine, which he coupled directly to a 1½ kw generator for lights and portable power tools.

Next, by means of a pulley at the end of the generator shaft, he rigged a belt drive to a two-stage air compressor for lube lines, perched on a separate pedestal atop the generator.

Third, determined to have a water pressure tank without an additional motor unit, he mounted a discarded air receiver tank in a vertical position near the rear. This tank holds 60 gal. of water. The tank remains under a constant pressure of about 15 psi from air provided by the compressor unit.

According to Ed Erblend, service truck driver, the equipment is easy to handle, as well as compact. The space saved by having only one motor instead of three motors and a water pump, permits greater capacity for gasoline, oil and lube supply, hence, cuts down trips for refills.

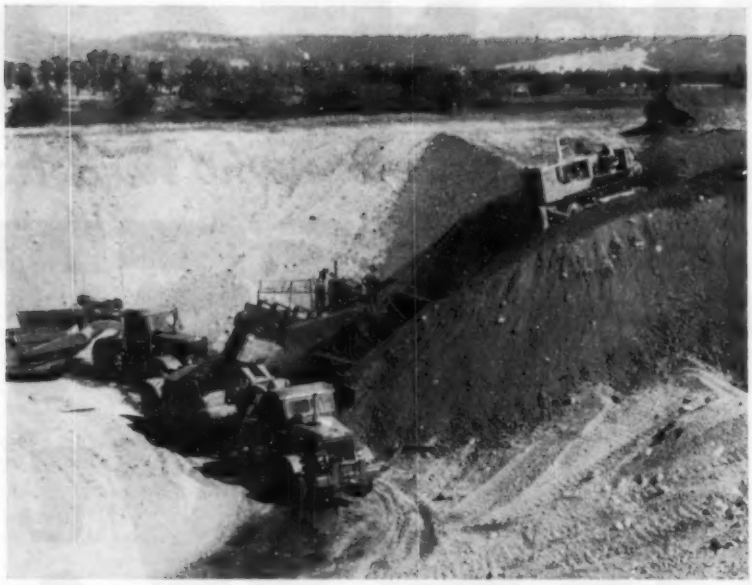
● General layout of service truck, showing water tank made from old air receiver.

Contractor designs own loader for dozer pit

The strange looking gadget pictured here in the bottom of a gravel pit is a belt-loader, designed and built by M. A. Degerstrom Company of Spokane, Washington, which firm recently has had a 600,000 cu. yd. earth moving project on the Spokane Valley Freeway near Spokane, Washington.

The contractor had the problem of loading gravel for hauling and spreading in large quantities. He hit on the idea of dozing the loose material by gravity into a hopper, feeding it by belt directly into hauling scrapers which he had on hand, and thus handling this production without having to bring in other special equipment.

The loader hopper feeds directly onto a 48-in. x 60-ft. belt, powered



● Euclid scrapers being fed by a special loader from material pushed over the pit edge by a D9 Caterpillar and International TD24 (the latter bulldozer not shown).

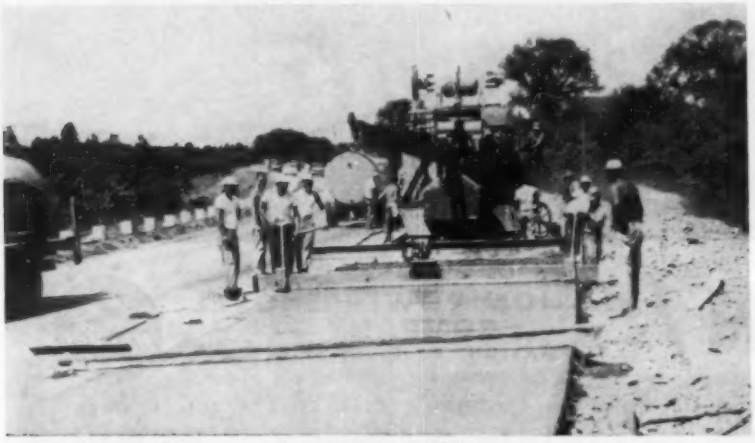
by a Case 65-hp. industrial motor.

The other equipment consisted of a D9 Caterpillar dozer alternating with an International TD24. Loads of 23 cu. yd. size were heaped into Euclid scrapers at the rate of 50 seconds per load, after which the scrapers traveled over the freeway grade to the points of embankment construction involving a 2½-mile haul.

Screed used to finish third lane

The Pasquale Construction Co. of Endicott, New York, was awarded a contract for putting in a concrete third lane on both slopes of a rather long hill near Chenango Forks, New York. They wondered just how they would finish off the surface of the 14 foot span. Since it was a rather small job, they realized it would not be too practical or economical to bring their large self-propelled road finishing machine on this job. Neither would it be very economical to just slide a 2x4 back and forth as is often done on very small jobs.

They decided that a Stow screed would be just the thing to do this job. Since it is easily portable, it would be no trouble to move it to and from the job. The Stow "power pak" which consists of a 2 HP Briggs and Stratton engine and a vibrating head, makes this screed operate fast and leaves a smooth surface.



● Vibrating screed improves and economizes small job.

A large self-propelled mixer was used which moved along ahead of the screed as the screed was pulled along up the hill by only 2 men. The concrete used had a maximum slump of 2". Any rough spots left after the screed passed were touched up with hand trowels. Then a stiff broom was pulled across the width of the slab roughing the surface up slightly to give better traction.

Lightweight ladder hangs on bridge parapet

To facilitate pointing up and rubbing of bridge parapet surfaces, the ladder shown in the accompanying picture was devised for a project at Oakland, California. Built of pieces of ¾-in. reinforcing rod welded together, the ladder is easily hoisted by one man and easily moved along from position to position. The contractor: Erickson, Phillips and Weisberg of Concord, California.

● Lightweight ladder made of reinforcing rods for finishing viaduct parapet.

● Harvey A. Scribner, president of Russell T. Gray, Inc., Chicago industrial advertising agency, has been appointed chairman of the 1957 Road Show Publicity Committee by the American Road Builders Association.

The show will be held at the International Amphitheatre in Chicago, January 28 through February 2, 1957. Mr. Scribner served in the same capacity for the 1948 Road Show.

MARION 43-

Good Right Arm for Contractors who need to

GET SET NOW!

For

Tough Jobs Ahead!

This MARION 43-M, on a basement excavation job in the northwest, carries 1¼ cu. yd. dragline bucket on 50-foot boom. Removable counterweight is power raised and lowered.

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POWER SHOVELS FROM ½ TO 60 CUBIC YARDS • DRAGLINES • CLAMSHELLS • LOG LOADERS
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-M

WHY-

GET SET NOW!

MORE TIME to (1) compare equipment (2) familiarize men with equipment before big jobs begin (3) work out financing details without delays (4) give new equipment its "shakedown" runs.

GREATER AVAILABILITY of (1) machines to choose from (2) erection men to assemble machine and train your men (3) front-end equipment to fit your needs exactly.

WHY-

43-M!

The MARION 43-M is today's outstanding 1 cu. yd. all-purpose heavy-duty machine. Many extra-value features. Carries 1¼ cu. yd. shovel dipper in stockpiling. A 27-ton lifting crane. With torque converter, serves as 1¼ cu. yd. hoe, 1½ cu. yd. dragline. Ask your MARION Distributor for Bulletin 415 for 12 pages of pictures and facts about a machine designed and built for big production on the heavy-duty big jobs ahead.

USE THIS CHECK LIST TO GET SET NOW!

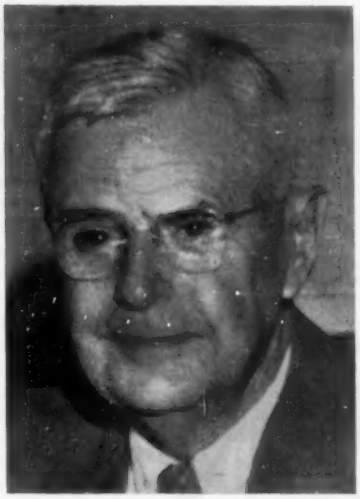
	Shovel (Cu. yds.)	Crane (tons)	Hoe (Cu. yds.)
MARION 32-M	¾	17½*	⅜
MARION 43-M	1	27*	1–1¼
MARION 362	1½	37	1¼–2
MARION 372	—	43	—
MARION 83-M	2	60	2–2½
MARION 87-M	—	75	—
MARION 93-M	2½	80	—
MARION 101-M	3	84	—
MARION 111-M	4	169	—

*Rated at 10' in accordance with general practice

Personals

Lucius D. Barrows Retires

Lucius D. Barrows, chief engineer of the Maine State Highway Department has retired after 45 years of service to the state of Maine. He is a past president of the Association of



Lucius D. Barrows

Highway Officials of the North Atlantic States, secretary of the Maine Good Roads Association, secretary and treasurer for the Maine Turnpike Authority, chairman of the board of Registration of Professional Engineers, and president of the Maine Chapter of American Society of Civil Engineers.

On the date of his retirement, he and Mrs. Barrows were tendered a testimonial dinner attended by more than 300 present and former officials and employees of the department.

NEWTON F. RONAN is appointed Superintendent of Operations and Maintenance for the New York State Department of Public Works. He succeeds V. L. Ostrander who recently retired after long service.

ARTHUR L. WEISENBERGER, formerly District Engineer of the Pennsylvania Department of Highways at Allentown, has been named Chief Engineer of the Department. He succeeds Major George J. Richards.

FRANK W. ITKOSKI has been named Director of Testing and Materials for the Pennsylvania Department of Highways.

Dr. D. B. Steinman, consulting engineer and bridge designer, has been awarded the International Grand Prize of Invention (Grand Prix International de l'Invention). This honor was conferred for his inventive and scientific contributions and achievements in the design and construction of major bridges.

DENNIS F. BRISTOW has retired as State Road Maintenance Engineer of Rhode Island at age 69. He joined the department in 1935 and was previously President of the contracting firm of Bristow Brothers and Knowles Construction Company.

Don G. Evans, veteran highway engineer, has been named District Engineer for The Asphalt Institute, serving Southern California and Arizona. Except for the war period, when he served with the Corps of Engineers, Evans has served the California Division of Highways from 1927 to date.

EUGENE F. GIBBONS has been appointed Chief Engineer of the New York State Department of Public Works. He succeeds George L. Nickerson who resumes the post of District Engineer at Albany for the Department.

L. P. ZIMMERMAN, recently Highway Engineer for Hennepin County, has been named Chief Engineer for the Minnesota Department of Highways. He succeeds O. L. Kipp who has recently been appointed to a position as Consultant.

VAUGHAN M. DAGGETT has been made Chief Engineer of the Maine State Highway Department. He was

Vaughan M. Daggett

Assistant Chief Engineer since 1951. His succession coming on the retirement of Lucius D. Barrows.

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SHAWNEE SCOUT 70

This Shawnee Ditcher available for mounting on 20 different tractors. Digs to a depth of 12 feet, loads to a height of 8 feet, 6 inches.

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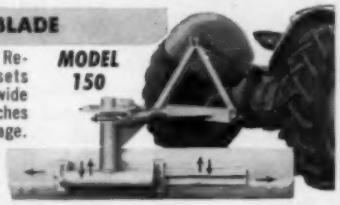

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Court Decisions That Affect Your Job

Trench digger perils

By William Hurd Hillyer

Danger of using trench digging machines in street work is brought out by a recent California decision. Corporation with contract for laying sewers subcontracted actual work but under prime contract had control of the subject area. Plans and profiles for the sewer system, prepared by an engineering company, did not show nor indicate a hidden casing-head gasoline extending across a sewer trench.

The engineering company verbally notified the general contractor and warned the subcontractor concerning this pipeline. This warning was not passed on to a certain employee of the subcontractor, although that employee was operating a trench digging machine near the pipeline intersection. In consequence his machine struck the buried line and he was killed in the resultant explosion. His heirs brought suit for heavy damages against the general contractor, all subcontractors, the engineering firm and the local realty development company.

Engineering firm was held excused by the court because it had notified the general contractor of the pipeline's existence and approximate course. Judgment was rendered against the general contractor on the ground that its negligence was the proximate cause of the accident. Affirming this judgment, the District Court of Appeal excoriated the general contractor and absolved the machine's operator of contributory negligence. The higher tribunal held that it was the general contractor's duty to provide that operator, as an employ of the subcontractor, "with a safe place to work and to warn him of danger."

N.B. Ann M. Raich etc. vs. Aldon Construction Co. et al, Civ. 20148 Dist. Court of Appeal 2d Dist. Div. 3, Calif. 276 Pac. 2d 822.

Abandonment by subcontractor

Subcontractor is not justified in abandoning contracted job because general contractor delays getting his extra-work bills approved and presents him with a counter-claim, California District Court of Appeal has decided.

The Water and Power Department of a city in that state let a contract for laying concrete water pipe under certain streets. It provided that holes for the pipe were to be bored from boring pits at specified intersections in order to avoid traffic congestion. A boring company was subcontractor for digging the pits, handling and jacking the casing, besides loading excess boring pit material into trucks furnished by the general contractor, pavement breaking crew, barricades and signs.

Boring company billed general contractor for extra work due to gas pipe interference and other items including alleged failure of general contractor to furnish proper trucking facilities. Confronted with a counter-bill from the general contractor for truck rental, the boring company quit. Thereupon it was sued by the general contractor for breach of contract. The court, as sustained on appeal, found that the boring company had abandoned its performance of the contract "without cause" and was responsible for all damages sustained by the general contractor as a result. Delay of contractor in paying bills for extra work because the items were not promptly approved by the city did not bar his recovery of breach-of-contract damages from boring company, the court held. Nor was he barred when that company "breached the contract first" by pulling out of the job.

N.B. — Artukovich vs. Simpson et al, District Court of Appeals, 2d Dist., Calif. 275 Pac. 574.

Highways held not insurer of traveling public

The Louisiana Supreme Court reversed decisions of lower courts in a seven-year-old damage suit against the State of Louisiana and the Department of Highways for $84,500, involving a state-maintained bridge which collapsed under a 29-ton truck.

Should the decision of the lower courts have been upheld, the highway department would have been, for all time, virtually gratis insurer of the traveling public on any of its 15,000 miles of highway systems, according to W. C. Pegues, highway general counsel.

This important case has a long history of litigation dating back to the collapse of a bridge over Bayou Bartholomew in Morehouse Parish on September 21, 1948.

The bridge was allegedly signed by the highway department to provide adequate notice to all users that the structure was unsafe for loads over three tons. A truck caused the wooden span to give way resulting in serious damages to the truck.

The decision by the State Supreme Court holds that the general public is entitled to rely upon the strength of all bridges on the state's primary road system for legal load limits. However, there is an exception to the rule. Where unsafe loads are supported on state secondary highways, the highway department has the right to restrict the weight that might be permitted on all of its bridges.

The highway department contended in its case that the bridge was plainly marked with a three-ton load limit sign and was in such an obviously poor and weakened condition that no reasonable man would attempt to put a 29-ton truck across it even in the absence of the sign.

Court of claims decision

The U. S. Court of Claims awarded that paying surety amounts due on a government contractor's default notwithstanding a prior assignment of such payments to a bank. The Court accepted the general opinion that the rights of a surety on a performance bond are superior to those of the assignee, the justification being that the surety is subrogated to the Government's rights, and the Government has a right to use the money to complete the contract.

Another position taken by the Court is that the surety's subrogation rights relate back to the date of the surety bond. A bank accepting assignment under a government contract is charged with notice that payment bond is a necessary part of his contract.

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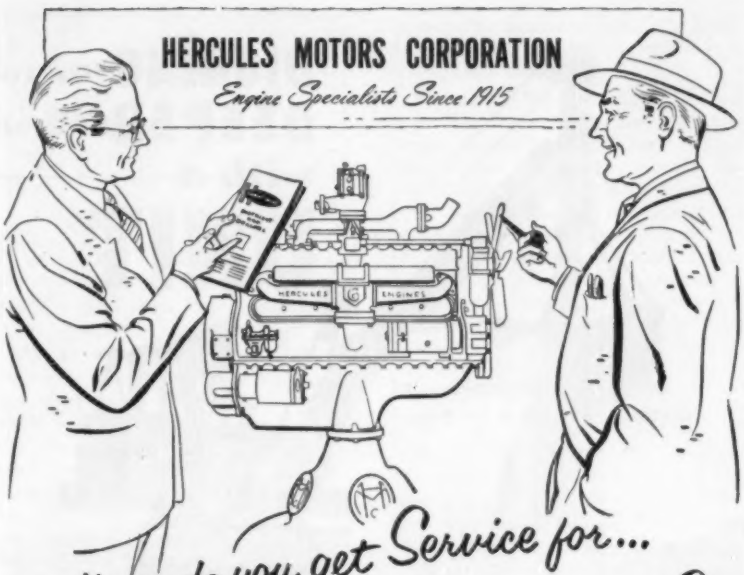

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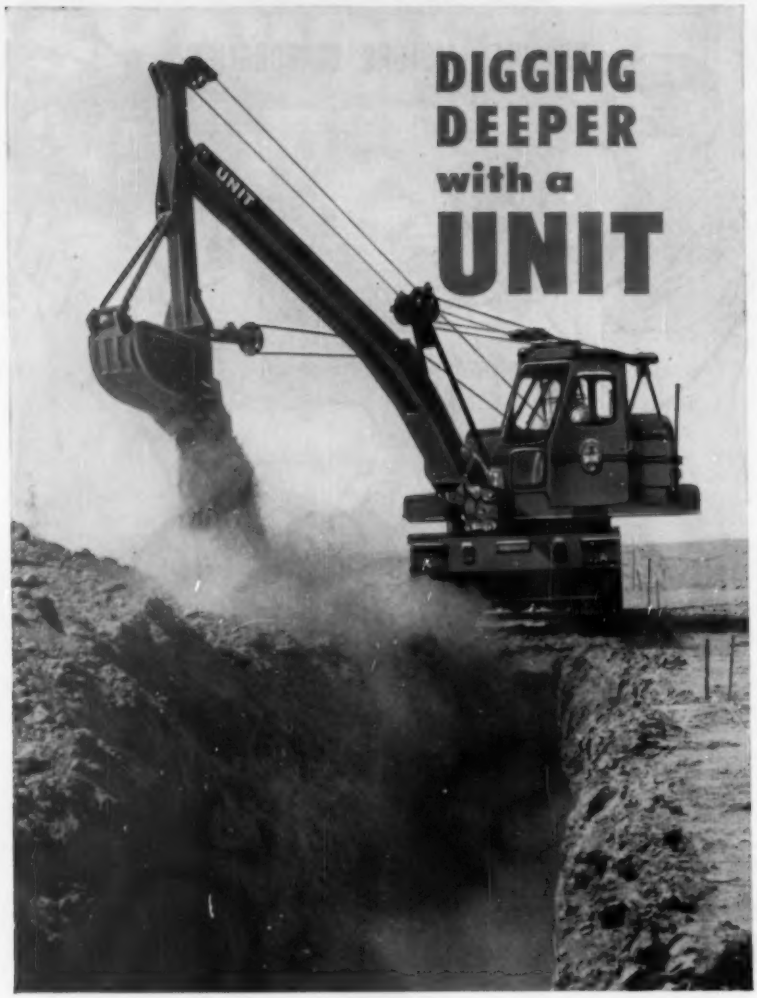

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Ready-mixed concrete shows high uniformity

Crushing tests on cylinders from 208 batches, comprising the entire mix for a 1000-cu. yd. construction job in Detroit, ranged from 2400 to 5400 psi at 7 days and from 3000 to 6400 at 28 days.

Statistical analysis showed a standard deviation of 464 psi and a coefficient of variation of 11.5% for the 7-day cylinders; and of 490 psi and 9.34% for the 28 day specimens. Mean strength was 4017 psi at 7 days and 5249 at 28 days.

Production was in transit mix trucks, loaded at the batch plant but not operated in transit. The order of charging was water-aggregates-cement. On reaching the job, additional water was supplied if needed, and the mixer rotated for the specified period.

The job occupied several weeks in the months of May and June. Two cylinders only were made from each batch — one for 7 and one for 28 days. These were cured in air on the job over night, and in water at the laboratory for the remainder of the period.

Ohio makes sufficiency rating on bridges

The Bureau of Bridges of the Ohio Department of Highways has completed a survey of bridges on all state highways outside of cities.

From the survey a sufficiency rating has been established based on structural strength, roadway width and general adequacy, the latter involving vertical clearance, waterway adequacy, general physical condition other than strength, and approach geometrics.

Of the 6,025 bridges over a 20 ft. span, 2,735 were rated 91% to 100%, 987 were rated 81% to 90%, 598 were rated 71% to 80%, 506 at 61% to 70%, 443 at 51% to 60%, 371 at 41% to 50%, 295 at 31% to 40%, 79 at 21% to 30%, and 11 at 0 to 20%.

Of the 8,868 bridges, 79% were built before 1940 and 46 prior to 1925. Meanwhile, legal loadings have been increased as much as 20% during the past 14 years with a considerable increase in stress.

• Dennis F. Bristow has retired as State Road Maintenance Engineer of Rhode Island at age 69. He joined the department in 1935 and was previously President of the contracting firm of Bristow Brothers and Knowles Construction Company.

500-ton Caisson Launched for New Orleans Bridge

A HUGE steel caisson recently was launched into the Ohio River at the Neville Island plant of Dravo Corporation, to begin the first leg of a 1,850-mile journey to New Orleans.

One of the largest steel floating caissons ever built by the Pittsburgh engineering and construction firm, it will become the foundation for Pier No. 2 of the $65-million Mississippi River bridge linking New Orleans and Algiers, La.

The launching ceremonies were attended by Mrs. J. Smith Miller, wife of the retired Dravo veteran construction engineer who helped develop many of the design principles incorporated in the caisson.

In half a century devoted to the construction industry, Mr. Miller pioneered in the development of floating caissons, cellular construction in steel pile cofferdams, and whirler derrick boats. These are tools which have improved the efficiency of a vital industry responsible for bridge foundations, docks, locks and dams, and similar structures.

Mr. Miller's logbook covers substructures for 44 bridges from coast to coast, as well as many river locks and dams. The roll call of bridges includes the East Bay Section of San Francisco-Oakland Bay Bridge, the Pennsylvania Bridge over the Schuylkill River in downtown Philadelphia, the Natchez Bridge over the Mississippi, and the Liberty, McKees Rocks, and Point Bridges in his native Pittsburgh.

From the Dravo yards, the Mississippi River Bridge caisson, "Highpockets," will be towed to New Orleans. It will form the bottom section of a concrete pier equivalent in height to a 34-story building. This is one of four main piers being constructed by Dravo for the new bridge which will have the longest cantilever span of any highway bridge in the world. Modjeski and Masters, Harrisburgh, Pa. consulting engineers, designed the structure. The bridge is a project of the Mississippi River Bridge Authority, Chairman of which is Capt. Neville Levy.

The all-steel caisson is 151 ft. long, 88 ft. wide and 20 ft. deep. It has 28 dredging wells, or tubes, each 18 ft. in diameter. After the caisson is moored inside a horseshoe-shaped stall 550 ft. out in the river, concrete will be placed between the dredging wells and the steel outer wall, causing the caisson to sink.

As it sinks, new sections will be added to the tops of the 28 tubes, and internally braced wooden sidewalls will be built on the caisson so that they remain above water. Sand, mud and clay are to be dredged out through the wells by clamshell buckets. Eventually, after the structure reaches final elevation some 180 ft. below water level and 118 ft. below the river bottom, the working chamber under the caisson floor will be sealed with concrete and the wells themselves will be partly filled to provide a permanent foundation for the bridge pier.

Florida Turnpike costs are below estimates

Savings of over $6,500,000 in the construction and financing of the $74,000,000 Hollywood to Ft. Pierce turnpike are claimed by the Florida State Turnpike Authority in a recent news release.

Bids for construction indicate a saving of over $3,100,000 under estimated costs. An additional $1,631,000 has been made available due to a bond discount and interest rate more favorable than anticipated.

Another $2,000,000 will be shaved from the estimates by lowering the height of the St. Lucie Canal Bridge from 80 feet to 55 feet. Favorable reinvestments of the proceeds from the bond sale not needed for immediate expenditures will save another $620,000. With a contingency fund of $6,500,000 untouched, this all adds up to considerably over $13,000,000 below feasibility estimates.

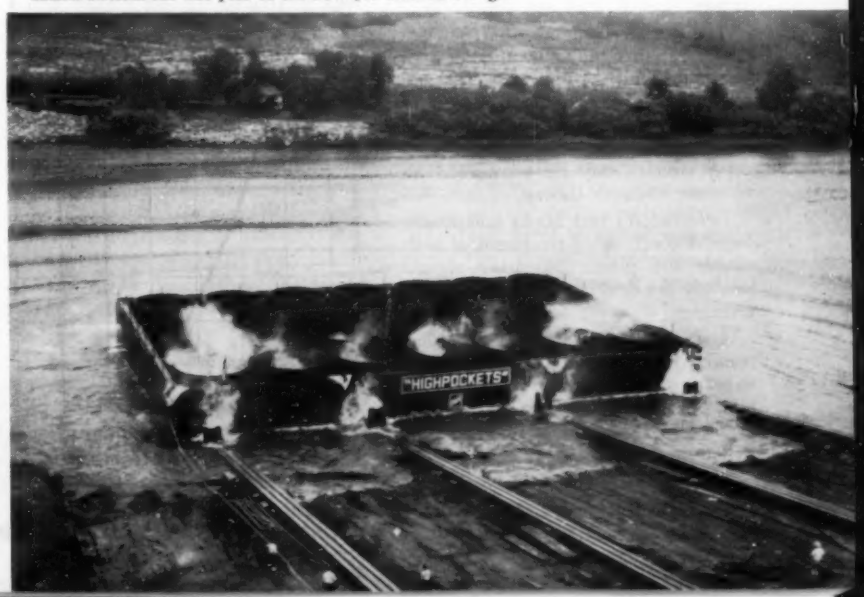
Law permits advance right of way acquisition

Acquisition of land for freeways can be accomplished in advance of the need for actual construction under a law passed by the Wisconsin legislature.

Designed to help the Milwaukee County Expressway Commission, the law creates a $5 million fund for purchasing land that otherwise would be developed with industrial, commercial or residential buildings in the course of time and thus increase eventual expressway costs. The commission could lease these lands until needed. The law also provides for acquiring air rights when needed for structures to carry freeways over existing buildings or land. And the commission has the power to order changes in grades of city and village streets, or the vacating of streets for freeway construction.

The county, under this law, must pay 2/3 of the cost of relocating utility wires or underground facilities disturbed by expressway construction.

● Resembling a giant honeycomb, this 500-ton steel floating caisson slides into the Ohio River from launching ways. The 151-ft.-long caisson will be sunk 180-ft. in the Mississippi River at New Orleans to become the foundation bottom for one pier of the new $65-million bridge.



DIGEST of Current Engineering Literature

By JOHN C. BLACK, Associate Editor

Television parking attendant

The Downtown Merchants Parking Association, Inc., of Oakland, California, has a new attendant — a closed-circuit television installation. The television is used to locate vacant stalls at one of the association's carparks.

This closed circuit television was installed about a year ago on an experimental basis. The local electronics company that made the installation, worked diligently to perfect it. So successful was the experiment that the association bought the installation and it is now in daily use.

The system is simple, employing a camera, mounted on top of one of the light standards. The camera is approximately 40 feet in the air and rotates automatically in an arc of about 200 deg., completing the arc in 7 seconds. The picture is relayed to a receiver located in the attendant's shelter at the carpark entrance.

Condensed from "Parking," Summer, 1955, "Highway Research Abstracts," 2101 Constitution Ave., Washington 25, D.C., September, 1955.

A plea to revise structural teaching

"The limit design and plastic theory methods are merely extensions of our present knowledge of structural action into that twilight zone between the end of the elastic range and utlimate failure."

The author contends that efficient design requires the application of both the elastic and the plastic theory, and that the latter should be given a place in engineering curricula accordingly. He also recognizes the empirical concept, which "may be considered an ultimate strength theory."

Referring to text books and teaching, "A coordinated treatment of both elastic and plastic properties should precede the development of any stress formulas."

And in conclusion, "The present trend to evaluate the full action of structures up to failure is most certainly a healthy one, which should eventually insure better control and structural design."

The discussion is general in character and brief, occupying only two magazine pages including characteristic diagrams.

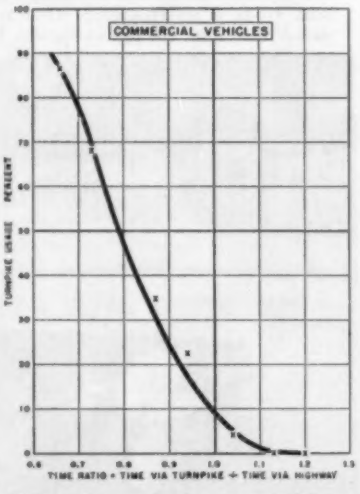
(Another article and three letters bearing on comparative analyses have appeared in *Civil Engineering* during the present year — "Can Design be Based on Ultimate Strength?" by Robert L. Ketter and Bruno Thurlimann, in the January issue; letters from two correspondents on page 64 of the March issue; and a reply from Messrs. Ketter and Thurlimann in August. *J.C.B.*)

"Plastic and Ultimate Load Theory Should be Included in Teaching of Structural Analysis" by G. C. Ernst, Chairman, Department of Civil Engineering, University of Nebraska; "Civil Engineering," 33 West 39th St., New York 18, N.Y., September, 1955.

Traffic usage of turnpikes

An impressively thorough study of traffic relations between Pennsylvania Turnpike and adjacent highways is presented. The accompanying diagram is one of 19 used to show those relations and various essential facts. There are also statistical maps and tables. Says the opening summary —

"Information regarding turnpike usage was collected at roadside-interview stations on the highways east of Harrisburg and west of Philadelphia during June, July, and August of 1950 before construction of the eastern extension of the Pennsylvania Turnpike, and on the same highways and the turnpike in 1952 after its construction.



● Turnpike usage by commercial vehicles in relation to the time ratio.

"Traffic diversion to the toll road was much greater for passenger cars than for commercial vehicles, except in the mountainous areas where the types of vehicle or purpose of trip made little difference.

"It was found that a much greater increase in traffic in the vicinity and general direction of the turnpike resulted after its opening than elsewhere in the State, indicating that this facility generated a considerable amount of new traffic.

"The travel-time ratio and time saved or lost were found to be good measures for determining the amount of traffic diverted from adjacent highways. Traffic used the toll road if time could be saved, even though the distance was increased; hence the greater the time saving, the greater the usage. Only a small proportion of traffic losing both time and distance used the toll road.

"The toll-road usage curves differ from similar curves established for free limited-access highways in metropolitan areas. It was found that the smaller the time or distance saved, the greater the difference between such curves. Traffic diverted to the Pennsylvania Turnpike was between two-thirds and three-fourths of that which would have been assigned from curves developed for free limited-access highways.

"Vacation trips as a whole accounted for greater usage of the toll road than trips for other purposes — presumably because there were a few very short trips and many long trips with vacations as the purpose.

"Vehicles traveling between Philadelphia and Pittsburgh used the turnpike to a very large extent regardless of purpose of trip and type of vehicle due to the large saving of time for all vehicles and of fuel as well for commercial vehicles."

A second article in the same publication deals in briefer fashion with the Maine Turnpike. The summary reads:

"The Maine Turnpike was opened to traffic on December 13, 1947, as an alternate route to U.S. 1 between Kittery and Portland, Maine. Traffic was interviewed both before and after con-

struction and continuous volume counts have been available since 1947.

"This article shows the traffic growth, the State of registration of the vehicles, the repetitive frequency of trips on both highways, and the effect of these variables on the proportion of traffic using the turnpike. An empirical curve of passenger-car traffic diverted to the toll road on the basis of time ratio is established and compared with similar curves for the Pennsylvania Turnpike and a free limited-access facility.

"The effect of increasing the toll rate from $0.50 to $0.60 and subsequently to $0.75 for a full-length trip is investigated and related to the amount of traffic using the turnpike. The amount of traffic attracted by the construction of the new facility beyond that anticipated from normal increase is determined, and the distribution of the excess increase between the old road and the turnpike is reported."

"Pennsylvania Turnpike Traffic Analysis" by The Highway Transport Research Branch Bureau of Public Roads, reported by Daniel O'Flaherty, Head, Traffic and Travel Studies Unit.

"Traffic Usage of Maine Turnpike" by The Highway Transport Research Branch Bureau of Public Roads, reported by Glenn E. Brokke, Highway Transport Research Engineer.

"Public Roads," Bureau of Public Roads, Washington 25, D.C., October, 1955.

Some specific benefits from good lighting

Figures presented show percentage accident reductions and cash savings effected through improved lighting of streets. Approximately 60% of all traffic fatalities occur during the dark hours when only one third of the 24-hour traffic is on the road. This means that the average fatality rate per vehicle-mile at night is about four times that by day.

"The night accident problem in Detroit has been given careful study. Before the lighting was improved on 31 miles of main thoroughfares, night fatilities were 6.9 times as many as those by day. After improved lighting, this ratio was reduced to 1.4. In Hartford, Connecticut, night accidents were reduced 46% on relighted sections of fourteen test streets. At twenty-three hazardous intersections on outlying arterial streets in Los Angeles, a 93% reduction followed the installation of lighting. In Washington, D. C., pedestrain injuries dropped 44% after a certain area was relighted.

The Cleveland Police Dept. reported that assults on women decreased 46%, and purse snatchings 41% after improved lighting.

"A relighting program in Hartford, Connecticut costing $20,000 a year, reduced night accidents in Hartford so drastically that, in spite of an increase in day accidents, the liability rates dropped 8% within five years. This reduction saved 22,500 Hartford citizens $4.00 a year each — or the community a total of *$90,000 annually!* Detroit and a number of other communities have also reported substantial premium reductions."

Characteristics of incandescent, sodium vapor, mercury vapor, and fluorescent lights are discussed briefly. The authoritative guide is "American Standard Practice for Street and Highway Lighting, approved by American Standards Assoc. and the Illuminating Engineering Society.

"Street Lighting for Safety and Economy" by David A. Toenjes, Illuminating Engineer, General Electric Co., The Highway Magazine, *Middletown, Ohio, April, 1955.*

Arguments for the highway bypass

This short article discusses the problem of relieving central urban areas from the burden of heavy cross traffic. It is of the public education character, being directed rather to non-technical officials and civic minded citizens than to traffic or planning engineers.

Primary theme is the benefit to local merchants (and to property values) through the elimination of traffic which, for the most part, does not stop at all, and when it does stop buys only on a minimum scale. The obstruction and inconvenience which such traffic throws on the otherwise normal business of the area causes losses vastly outweighing the incidental business that it brings.

Two types of such belt highways are shown in perspective drawings and discussed briefly — the simple, or conventional types, with no control of access, and the route with controlled access and the special provision of "frontage roads" to preserve the full rights of abutting property.

Five major sources are listed as having provided material on which this article is based.

"Progress in Treatment of Bypasses" by Leah Moncure, Designing Engineer, Road Design Division, Texas State Highway Department, "Texas Highways," Austin 14, Texas, September, 1955.

How shall engineers maintain their rights?

The answer of one young engineer to this question, pertinent to the entire profession, is given in the winning paper of four presented for the Daniel V. Terrell Award of the District 9 Council of American Society of Civil Engineers at the meeting at Purdue University on May 4 of this year — subject, "Unionization and the Young Engineer."

Resenting the coercion of labor unions in trying to force civil engineers and others into their ranks for bargaining; maintaining that though the unions have served a righteous purpose in advancing their members' interests, union viewpoints and objectives do not properly cover the professional status of the engineer as an originator of ideas and a bearer of ultimate responsibility; recognizing that employers have taken advantage of their engineers many times, but believing that union methods of bargaining do not meet professional needs, the author presents his case for an organization on the order of American Medical Association.

"Unprofessional treatment, low pay, need of an organization to take the part of the engineer when organized pressure is exerted — these are the more obvious causes of dissatisfaction among engineers, the more obvious reasons for the manifest interest in collective bargaining.

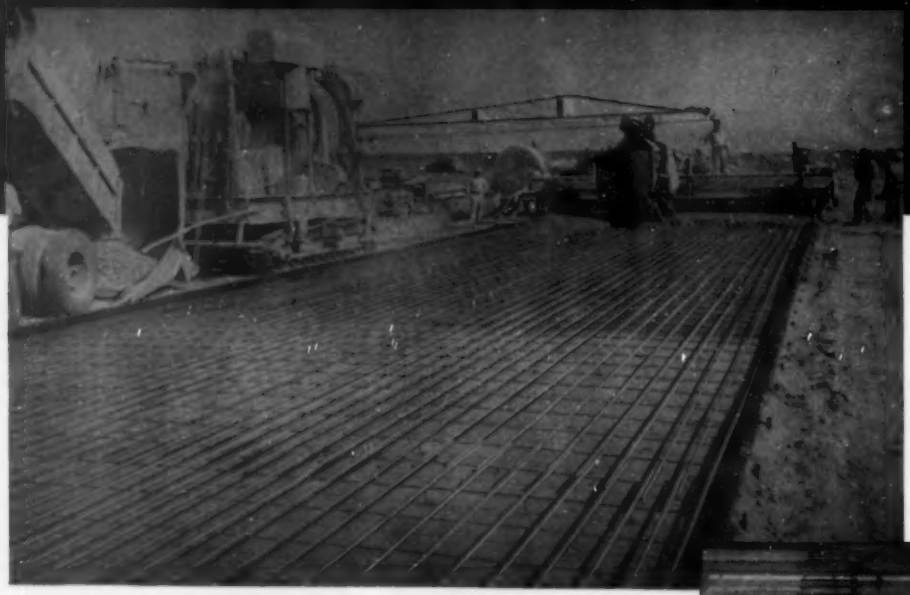
"An evident truth, I think, is that interest in collective bargaining by engineers will vary directly as the intensity of their unmet needs. So it would seem that the solution should be in the form of a strong professional organization to meet the needs of the engineer, an organization with power to do for the engineer about what the AMA does for the doctor."

However, the case is conditional. "Our professional organization should be unified and strong enough to meet the engineer's legitimate and very real needs. But if it is not and gives no indication of becoming so — the need is still there. Is it not better for our profession, rather than merely to ignore the need, to take steps in a direction which we realize is not ideal, but which seems to be the best thing under the circumstances?"

The paper is brief — about 2200 words.

"Unionization — A Vital Question Awaits an Answer" by Baxter W. Napier, Jr., J. M. ASCE, Assistant Engineer, Hazlet & Erdal, Consulting Engineers, Cincinnati, Ohio, "Civil Engineering," 33 West 39th St., New York 18, N.Y., September, 1955.

Picture of a Good Road's Backbone



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AED's 1955 Green Book

Reflects Higher Rental Rates

A DECIDED increase in rental rates for construction equipment is reflected in the all new Seventh Edition (1955) "Compilation of Rental Rates for Construction Equipment," released by Associated Equipment Distributors, national trade association of the construction equipment industry.

Rental rates for some 2,000 items listed in AED's 1955 "Green Book" are national averages based on a survey conducted this summer by the Association among its 700 distributor members.

In comparing the new rates with those of the Sixth Edition (1953), it is impractical to arrive at a percentage of increases on an *overall* basis. Listings and classifications of equipment have been changed, and a substantial number of items appear in the Compilation for the first time.

Following are a number of items picked at random from the new book, giving a comparison (percentage-wise) of the 1955 rates with those of the previous edition.

AIR COMPRESSORS: Portable, high pressure, gasoline-engine compressors are up 5% to 9%, except for 60-cfm and under units which are about the same. Rental rates for self-propelled compressors, 60-cfm and under, are off 15%, while large 60- to 125-cfm units remain stable. Still higher increases are evident in rates for stationary compressors.

Dragline Buckets Higher

BUCKETS: All listed sizes of clamshell, concrete and dragline buckets show higher rates. Dragline buckets over 2¼ yd. are up 11 to 14%, and the ¾-yd. up 25%. Grab, orange-peel and tip-over buckets are not listed in the new "Green Book."

CRANES AND SHOVELS: Rental rates for crawler mounted Lifting Cranes (gasoline and diesel), up to and including 20 tons, have climbed 10%. Other size units are up 17% to 19%. Similar increases are apparent for crawler mounted power shovels. The 1955 edition contains substantially more information on cranes and shovels than did the previous edition.

DRAGLINE EXCAVATORS: Crawler mounted, gasoline and diesel powered draglines are renting anywhere from 10% to 20% higher than in 1953. Steam rigs, no longer in popular use, have been dropped from the compilation.

FINISHING MACHINES: Bituminous spreaders and finishers (crawler mounted, self propelled), show an increased rate of 12% for the gasoline powered unit, and 24% for the diesel powered unit. Concrete highway finishing machines, gasoline and diesel engine driven, are up 29% (widths 10 to 15 ft), and 40% (widths 20 to 25 ft.).

GRADERS: Rates for pneumatic tired, gasoline powered, self propelled graders are up 7% to 13%. Diesel powered units, up 17% to 22%.

HAMMERS (electric): Rates approximately the same or slightly below 1953.

HEATERS: Portable space heaters, oil or gas fired, are off 10 to 20%. However, listings have been enlarged, and classifications have been revised according to BTU per hour, making an accurate comparison impossible. Portable tank car heaters have been dropped from the compilation due to insufficient information.

LIGHTING PLANTS: Rates for this equipment, AC or DC, gasoline powered, are down about 5% except for the 17,000 to 22,000 watt units, up 5%. Diesel engine lighting plants up to 15,000 watts are 10 to 12% over their old average rates.

MIXERS: Concrete, portable, tilting and non-tilting drum (low charger and power charger) up 6% to 10%. Paving mixers, crawler mounted, gasoline and disel engine powered, up 15% to 28%. Truck mixers or agitators, up about 5% in most sizes.

PUMPS: New rental rates indicate only slight increases, around 2%, for gasoline powered centrifugal pumps; for diesel engine units, 10%. Diaphragm pump rates are up and down, depending on size. For example, the 4-in. single action, 4½-hp. pump shows an increase of 7%; while the same size, 4½ to 9 hp., dropped 7%. Rental rates on jetting pumps, gasoline and diesel, are consistently higher, ranging 10% to 20% over 1953 rates.

ROAD ROLLERS: Two and three wheel, gasoline and diesel engine driven, rollers are up anywhere from 3% to 26%. The same range of increases also applies to pneumatic tired, compaction, towed and self-propelled rollers, except for the 50 to 100-ton units that remained about the same.

SCRAPERS: This equipment, without power units, shows rate increases ranging to 20%; average up 15% over 1953.

TRACTORS: Accurate percentage comparisons of rental rates for tractors are impossible due to the changes in drawbar horsepower ratings. The tractor section of the 1955 Green Book has been completely revised to show national average rental rates by make and model, rather than drawbar horsepower. This eliminates confusion and provides more realistic information to users of the Compilation.

VIBRATORS: Concrete vibrators, electric and gasoline powered, show an increase in rental rates up to 17%. However, in the larger units, it is evident that rates are about the same, or increased only slightly.

WELDING MACHINES: Gasoline and electric powered welding machines are the same to 5% below 1953. A sharp contrast appears in the rates of AC Arc units, with rates up as high as 83% above the old book.

Where Obtainable

The 1955 "Green Book" can be obtained from the publisher, Associated Equipment Distributors, 30 East Cedar Street, Chicago 11, Illinois, for $5.00 per copy. The rates listed in the book do not, of course, represent rental rates charged by distributors in any particular section of the country; they are national average rates developed from the AED Survey.

Articles and Pictures Invited from Readers

The editors of ROADS AND STREETS are interested in articles or photographs from readers on matters deemed to be of interest to fellow highway engineers, contractors and their superintendents. Complete articles preferred, but rough notes or a letter outlining facts also welcome.

Contractors: Send us job pictures and brief information on effective field methods devised by your staff, for which they should receive credit; discussion of problems and practices effecting contracting.

Engineers: Articles on technical topics, examples of progressive design, interesting projects, noteworthy plans or programs.

ROADS AND STREETS covers the planning, administration, location and design, constuction, maintenance and traffic operation — of roads, streets, bridges and grade separations. Also the civil engineering end of airfield work. Accepted articles paid for.

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Climatic Changes Caused by an Inferred 672-Year Planet

By Halbert P. Gillette

President and Publisher, Gillette Publishing Company

IN several previous articles evidence has been cited that planets cause weather cycles. The present article summarizes that evidence, mainly as to an inferred planet, designated as Alpha whose orbital period is 672 years.

Fig. 1 is a graph of the thickness by decades of tree rings in Formosa. It was originally published in 1948 in a book by Prof. Hideo Nishioka of Keio University, Tokyo, and reprinted in the Magazine *Cycles*, Nov. 1951. The median curve shows minimum ring thickness about 1325 A.D. and the last maximum about 1660, indicating a cycle of about 670 years in length.

Fig. 2 is from a photograph taken in 1940, showing several of 32 pairs of shale beds that record climatic cycles doubtless caused by Alpha. The white beds contain calcium carbonate precipitated from surface water of a sea during the warm phase of the cycle; for limestone is somewhat dissolved by carbon dioxide in streams. As the temperature of such waters rises, precipitation of the calcium carbonate occurs in the sea. The dark strata of each pair were deposited during the cool phase of the cycle. Hence a pair of white and dark beds (originally horizontal but later tilted) record a complete climatic cycle, modified somewhat by shorter cycles.

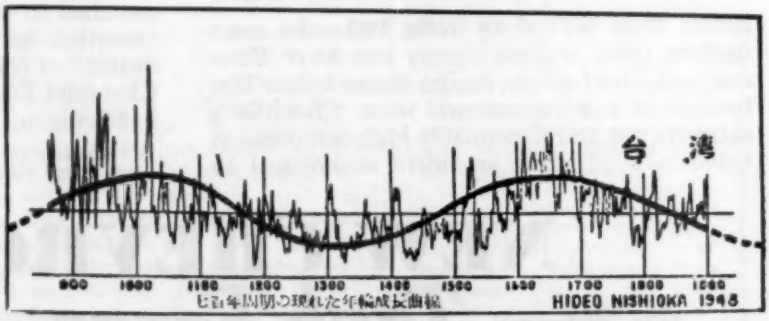
Thin laminae of silt are annually deposited in lakes, and are technically known as varves. Varves are also found in many stratified rocks, and their thickness is commonly 10 to 25 to the inch. In this case they average about 12.5 to the inch, or 150 to the foot. The pairs of beds average about 4.5 ft. thick. Hence the climatic cycle thus recorded by nature is about 675 years between extremes, and therefore must be the same cycle recorded by nature in tree rings of Fig. 1, on the island of Formosa, millions of years after it was recorded by the strata of Fig. 2. Fig. 2 shows strata in a cut on a highway leading from Ventura Boulevard over a pass into Topango Canyon about 50 miles west of Los Angeles, California.

Because the writer has found that each of the four giant planets causes weather cycles in the thickness of tree rings and of varved silts in ancient lake beds, as well as in a core taken from the bed of Lake Saki, Crimea, he inferred that Figs. 1 and 2 indicate that an unseen planet was the cause of this cycle.

Confirming this inference there is a "family" of eight comets that indicate a planet whose orbital period is about 678 years. Dr. C. H. Schulte, in *Popular Astronomy*, April 1949, has given data relative to those comets, showing that they probably were "captured" by a Transpluto planet. He gave also a table of the number of comets in the "family" of each of the four known giant planets.

The earliest researcher of the probable cause of cycles in the number of sunspots was a celebrated Swiss astronomer, Rudolf Wolf. Nearly a century ago he found a sunspot cycle of 9.93 years which is the mean length of the interval between a conjunction and an opposition of Jupiter and Saturn. H. H. Clayton, in his *Solar Relations to Weather*, Vol. 1, p. 94, rediscovered that sunspot cycle and gave the same explanation that Wolf had given.

The first electrical hypothesis of Schwabe's "11-year" cycle was that of Prof. Elias Loomis of Yale, published in the *American Journal of Science and Arts*, Sept. 1870. He based his explanation on the correlation between maxima of sunspots, aurora and terrestrial magnetic disturbances. But he did not explain how a solar current could span the 93 million miles to the earth. However in 1897, J. J. Thomson discovered and crudely weighed the electron, and in 1905 S. A. Arrhenius showed that the pressure of light would impel solar ions forth and even push the tail of a comet away from the sun. George Ellery Hale discovered in 1908 the rotation of sunspots, in 1913 that the sun is a magnet like the earth and in 1919 that sunspots usually occur in pairs of opposite magnet polarity. This led the writer to infer and publish in 1930 that sunspots exemplify Faraday's (1821) principle of rotation of an electric current in a magnetic field; and led this writer later to infer that radiant solar waves accelerate emitted ions until their velocity is that of light. At any such velocity electron streams would cohere magnetically;



● Fig. 1. Graph of Formosa tree ring thickness by decades recording a 672-year rainfall cycle due to the inferred planet Alpha.

The electromagnetic theory of the cause of cycles leads to the inference that Alpha, near its rainfall maxima, would cause an abnormal number of destructive earthquakes. This was the case near 1658, as shown by the number of such quakes during each of three decades:

A.D.	*Destructive Quakes*
1615-1644	101
1645-1674	144
1675-1704	103

Since then the number of destructive earthquakes reported per decade has increased progressively, due both to increasing sizes of cities and to better reporting of such events. Milne's Catalog of Destructive Earthquakes lists:

382 in the 17th Century
682 in the 18th Century
2120 in the 19th Century

Alpha was not entirely responsible for the 40% increase above shown in the 3 decades centered in 1658, for that was also a peak date of the Beta cycle of 3 × 672 or 2016 years as shown in previous articles.

A very surprising abnormality as to sunspots occurred between 1648 and 1670, for almost no sunspots were then seen. The writer infers that for the decade preceding the peak in 1658, and for about another decade thereafter the sun was beclouded by ions emitted by sunspots. A similar cause seems to explain why alternate peaks of the 11.2-year sunspot cycle tend to be higher, while the one corresponding with a higher rainfall peak tends to be a lower sunspot peak.

and, since they would rotate as sunspots do, they would have magnetic polarity. Thus solar magnetic energy would probably be conveyed vast distances with slight loss.

The accompanying table shows lengths of conjunction periods caused by the four know giant planets and the inferred Alpha. It shows also a recent conjunction date of each pair of these planets. As stated in the footnote, cycles of half these lengths occur, with a secondary peak when two planets are in solar opposition or 180 degrees apart. It should be noted that the Wolf-Clayton sunspot cycle of 9.93 years was confirmed by the writer's finding it a 9.93-yr. in the thickness of the rings of California sequoias (big trees) back to 1300 B.C. and in Lake Saki varves back to 2300 B.C.

A cycle of 9.75 years, or very nearly this 9.93 length, was found by Sir William Beveridge (*Journal Royal Astron. Soc.*, 1922) in the prices of wheat for three centuries. He found also in wheat prices several other cycles in this table, whose lengths he deduced to be 35.5, 19.9, 15.2, 12.84, 12.05, and 5.96 years. He did not attempt to determine their causes.

The 35.5-year cycle is commonly called the Bruckner cycle, announced by E. Bruckner in 1890, but first announced by Sir Francis Bacon in one of his essays nearly three centuries earlier. Bacon said: "There is a toy, which I have heard, and I would not have it given over, but waited upon a little. They say it is observed in the Low Countries . . . that every 5 and 30 years the same kind of suit of years and weathers come about again."

The writer found in thickness of tree rings and lake varves that this Bacon-Bruckner cycle has a length of 35.87 years, and in 1952 predicted a very stormy winter season of 1952-53, because a Saturn-Neptune conjunction was due 1953.13. It had its severest effects in northern Europe, causing 1,800 deaths by flooding dykes in Holland.

In the October 1954 issue of the *Bulletin of Meteorological Society* the writer published a table of the average number of sunspots each calendar day for 50 years. The maximum was July 12, which is 57 per cent greater than the minimum about Jan. 10. The earth's heliocentric (sun-centered) longitude is 290 degrees July 12; and as that is very near the longitude of direction of the sun's orbital motion, it had long previously occurred to the writer that other planets might cause abnormal numbers of sunspots when in longitude 290 degress. This proved to be the case, and either rainfall or tree-ring thickness was found to be a maximum then too often to be accidental. Thus it became possible to determine approximately Alpha's heliocentric longitude when it caused maximum rainfall, or minimum temperature in Northern Europe which was in 1658. A reason for this phenomenon is given later.

In January 1658 the Baltic Sea between Sweden and Denmark froze so thick that cavalry under Prince Charles crossed at night and conquered the Danes.

In an English magazine, *Weather* (Jan. 1951, pp. 17-21) D. Justin Schove gave data on the extreme frequency of hail in Europe A.D. 1631-1680. "The period 1651-80 stands out as the culmination of a cold period, the first of those cold periods which go to make up what is known as the Little Ice Age. This analysis also indicates that hail and thunder were more frequent during the 30-year period 1641-70 or the half-century 1631-80 than in the periods of similar length that preceded or followed them." Note that the middle of this 50-year period was 1656, and that the Baltic froze in 1658, the year that the writer regards as the time of a rainfall maximum due to Alpha. It follows that the minimum rainfall of this 672-year cycle will occur about 1994.

In the *Bulletin of the American Meteorological Society* (Feb. 1936, p. 62) E. P. Stebbing is quoted as saying that in 300 years the Sahara Desert has crept southward 186 miles into what was formerly farm land. This long increase of dryness began about when the wet peak of the Alpha cycle ended in 1658.

According to E. W. Brown of Harvard, the earth's axial rotation, as shown by the moon's motion relative to the earth, was slowest about 1660. The writer ascribes this to increased oblateness of the earth due to the magnetic maximum caused by Alpha in 1658.

There is abundant evidence in many regions of decreasing rainfall and increasing warmth for the past 100 years. For example, the Nisqually Glacier in western Washington has been retreating since 1857; and the mean annual temperature has risen in a century, 4 degrees in New York City and 3 in Philadelphia.

Although this article relates to the climatic cycle caused by an inferred planet of greater electromaget energy than any of the four giant planets, cycles caused by those four have been discovered, and some facts have been cited above as to the cause of the sunspot cycle of 11.2 years, and its correlated cycles in aurora, magnetism and weather. Because meteorologists have often expressed skepticism as to the weather importance of this cycle, it seems well to quote a paragraph from Richard Hakluyt's *Book on Voyages* published in 1600:

"I went aboard the shippe of Bengala, at which time it was the year of Touffon; concerning which Touffon ye are to understand that in the East Indies often times there are not stormes as in other countries, but every 10 or 12 years there are such

● Fig. 2. Paired beds of white and dark shale recording a 672-year weather cycle due to the inferred planet Alpha.

tempests that it is a thing incredible."

Two hundred and forty-three years were then destined to elapse before the first clue to the cause of that "11-year" cycle was discovered. Then the discoverer was a German apothecary, S. H. Schwabe, who announced the finding of such a cycle in sunspot numbers, after 18 years of daily examination of the sun with a small telescope. The Loomis hypothesis (1870) of the cause of correlation between Schwabe's sunspot cycle and a cycle in auroral frequency and magnetic storms is cited above. In 1872 C. Meldrum correlated the "11-year" cycle of sunspots with one in rainfall, notably in the tropics.

The exact length of this Schwabe cycle cannot be determined from sunspot counts, not only because they go back only about two centuries, but because the sunspot numbers record also the effects of many planetary cycles. By analyses of thicknesses of California tree rings back to about 1300 B.C. and Lake Saki (Crimea) varves back to 2300 B.C., this cycle is found to be 11.20 years, and that it is harmonic with one just double that length. The latter is Hale's cycle in the magnetic polarity of sunspots. Their cause has been very puzzling. Certainly it is not planetary. Homer Clough, an astronomer who has spent many years in cycle research, has cited facts that indicate that the 11.2-year cycle is generated within the sun.

The writer's hypothesis is that the sun has a magnetic core that rotates in 22.4 years, and that, as each of its two poles passes an emitted major solar ionostream in heliocentric longitude 290 degrees, an abnormal number of sunspots tends to be generated. In a previous article the writer has suggested that the sun may become charged with cosmic electrons as a result of its orbital flight through them, and that discharges occur in at least 12 fixed ionostreams, the main one being in longitude 290.

That 12 solar ionostreams exist is indicated by the fact that each planet causes either a known sunspot or a known weather cycle or both whose mean length is 1/12 that of its orbital period. For Alpha this cycle has a length of 56 years which is just 5 times the cycle of 11.2 years. Coincident maxima of the sunspot cycles of 11.2 and 56 years were due July 12, 1938. For the month of July 1938 the Wolf number was of 165 spots daily!

Since the 56-year cycle is an Alpha subcycle having a very great sunspot peak in 1938, it serves to confirm Alpha's calculated orbital period of 672 years. It serves also to confirm Alpha's calculated longitude, and that its orbit is nearly a circle. This is confirmed also by the tree ring and lake varve peak dates of the conjunction dates of Alpha and the four giant planets in the accompanying table.

The three outermost known planets, Uranus, Neptune and Pluto have orbital periods of about 84.013, 164.793 and 248.430 years. Dinsmore Alter has called attention to the fact that these lengths are nearly commensurable, the ratio being nearly 1:2:3. To this ratio series we can now add 8, for Alpha's period is 8 × 84. Even approximate commensurability of orbital periods may indicate that originally they were harmonic.

Rainfall Cycles Due to Heliocentric Conjunction of Giant Planets

	Cycle Years	*Conjunction*, A.D.
Jupiter-Saturn	19.859	1941.5
Jupiter-Uranus	13.808	1941.7
Jupiter-Neptune	12.789	1945.6
Jupiter-Alpha	12.071	1954.2
Saturn-Uranus	45.368	1942.6
Saturn-Neptune	35.871	1953.13
Saturn-Alpha	30.808	1944.3
Uranus-Neptune	171.33	1822.8
Uranus-Alpha	96.00	1946.5
Neptune-Alpha	218.35	1884.8

FOOTNOTE: Cycles in thickness of tree rings often have maxima at opposition as well as conjunction of these giant planets. Alpha is an inferred giant planet of 672-year orbital period. The dates of its conjunctions are approximate, for its orbital eccentricity is not known; but they agree well by big tree-ring analysis with the dates here given.

● Soil freezing. Bulletin #100. Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C. Price 60 cents.

This Bulletin contains three important papers presented at the Board's January, 1954 meeting: "Freezing-and-Thawing Tests on Calcium Chloride and Soil Mixtures," as reported by E. J. Yoder. "Frost Determination by Electrical Resistance," reported by E. F. Rowland, L. H. Stolzy and G. A. Crabb, Jr. "Frost Action on Small Footings," covered by W. A. Trow, relating to experience on the power project in Canada. The above papers are discussed by several authorities. A valuable contribution to the field.

● D. W. Lewis, formerly Research Engineer, Indiana Joint Highway Research Project, and Associate Professor of Highway Engineering, Purdue University, has joined the National Slag Association as Chief Engineer with headquarters at 613 Perpetual Building, Washington 4, D.C.

During his nine years on the staff of Purdue University, Mr. Lewis was actively engaged in the field of aggregate and concrete research. He holds membership in the American Concrete Institute, American Society for Testing Materials, Highway Research Board, and the American Society of Civil Engineers (Assoc. Member) and is registered as Professional Engineer in the State of Indiana.

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Excavation Safety Tips

From the Corps of Engineers "Safety Bulletin"

No fancy formulas, but a common-sense summary of what to guard against and what to do to insure against cave-ins and other types of accidents.

VERY seldom does a day go by that we can't pick up a local newspaper and read that some workman has either been crushed or smothered to death by a slide or cave-in on an excavation job. One big reason for this type of accident is that too many people are fooled when they think that a slice of earth is as solid and stable as it looks.

The physical stability of the materials in the earth structure, such as quicksand, clay, wet sand, coarse sand, soft or hard rock varies considerably and any one or many of these materials may be found in a single cut.

When we have an excavation job to do we must first investigate the location of the job and determine whether or not our work will disturb any nearby building, sidewalk, road, trees, power poles, etc. The location of underground utilities such as electric, telephone, gas, water and sewer mains must be determined before excavation begins. If any of these utilities are to be removed, service must be discontinued before operations begin. If utilities are to be left in place, protection against their damage must be provided during operations.

Next we must study the character of the soil and find out whether it is more practicable to slope the cut enough to assure against a cave-in or to shore it. If shoring is to be used experience has taught us that in practically all materials, except solid rock or hard shale, shoring should be provided as soon as we reach a depth of 4 ft. and should be extended as the cut is made deeper until the bottom of the excavation is reached.

Remember, fills are particularly treacherous regardless of the material and all cuts through fills must be shored solidly. When a cut is alongside a previously backfilled excavation, especially when nearer to the old fill than the depth of the cut, special precautions must be taken. Saturation of parallel backfilled trenches will exert pressures on the side of a cut that can prove disasterous if shoring is not provided and reinforced to resist the added pressure.

We must realize that when the water table is high or there is a broken water line at or near the excavation, the stability of the side of a cut decreases as the degree of saturation rises. It is known that a rainstorm may increase the earth pressure by as much as 33%. We must design our shoring to withstand these additional pressures.

We must consider the possibility of rains, frosts, and thaws since slides and cave-ins often result from such causes and we must provide for these possibilities. Excavation is a very expensive operation and having to do it a second time due to a slide or cave-in is a needless waste of time and money and often will delay or stop the entire job. Of course the best procedure is to backfill as soon as possible.

Often it is necessary to excavate near roads or near where cranes or other heavy equipment is operating and the vibration of trucks or other equipment will cause sudden cave-ins so the need for proper shoring is that much more important.

If a cut has a nearly vertical face, many times a crack will develop on the surface parallel to the edge of the cut and back a distance of about one-half of its depth.

A rupture will eventually develop along this crack, dropping almost vertically for a distance, then curving in to the wall of the cut near the bottom. It is quite certain that a cave-in will eventually occur along such a rupture and any saturation of the soil, nearby vibrations, freezing or thawing will speed the failure.

Excavating along an adjoining foundation wall at a greater depth than the foundation is a tricky proposition and before proceeding with the excavation the appropriate engineer should be consulted for advice as to the bracing, underpinning, etc., required to prevent the footing from settling.

If a cut has to be made along a roadway, sidewalk, or high earth bank, care must be taken not to undermine and the sidewall must be shored tightly and braced with walers and struts.

When making a cut the excavated material must be placed well back from the face of the cut. If this is not done, sooner or later, a rock or clod will fall into the cut striking a workman or the overburden created at the top of the cut will result in a slide or cave-in.

When men are required to work in trenches or other excavations, access to and from the excavation must be provided. This is usually done by providing safe ladders every hundred

Use Sound Strong Lumber

Just as when building a scaffold the idea that any kind of material lying around the job is good enough for shoring is entirely wrong and extremely dangerous. Materials used for sheeting and sheet piling, bracing, shoring and underpinning must be in good serviceable condition, and timbers must be straight, sound, and free from large knots, and strong enough to withstand the loads that will be imposed on them.

Wood sheathing must be at least 2 in. thick and increases as may be necessary to adequately support the sides of the excavation. Planks used as sheathing are merely beams supporting the lateral earth pressure loads. The maximum allowable distance between the horizontal stringers or walers must be such as to keep the planks within their safe bending stress. Braces are merely columns or struts and must do the same job as any column or strut. The most important thing that we can do in preventing accidents and delays in a trench excavation is to get the work done that has to be done in the trench as quickly as possible and then backfill it immediately. Leaving a trench open longer than absolutely necessary is an open invitation to accidents and is an inexcusable practice.

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. . . for more details circle 219, page 16

(Photo used by special permission of the Philadelphia Bulletin.)

Yes, in Philadelphia nearly every contractor uses at least one Owen Bucket — some have several — for excavating — trenching — dredging — material handling.

Soon scores of Owens will dig the landscape and dot the sky in the building of Penn Center, Philadelphia's 22 acre 100 million dollar development.

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. . . for more details circle 251, page 16

feet of trench or fraction thereof for the workmen; otherwise they may be subject to jumping and climbing hazards.

Men working in trenches must be spaced far enough apart to avoid being struck by tools or materials wielded by fellow workers and should be provided with safety shoes, hard hats, and other safety apparel as appropriate as the hazards involved.

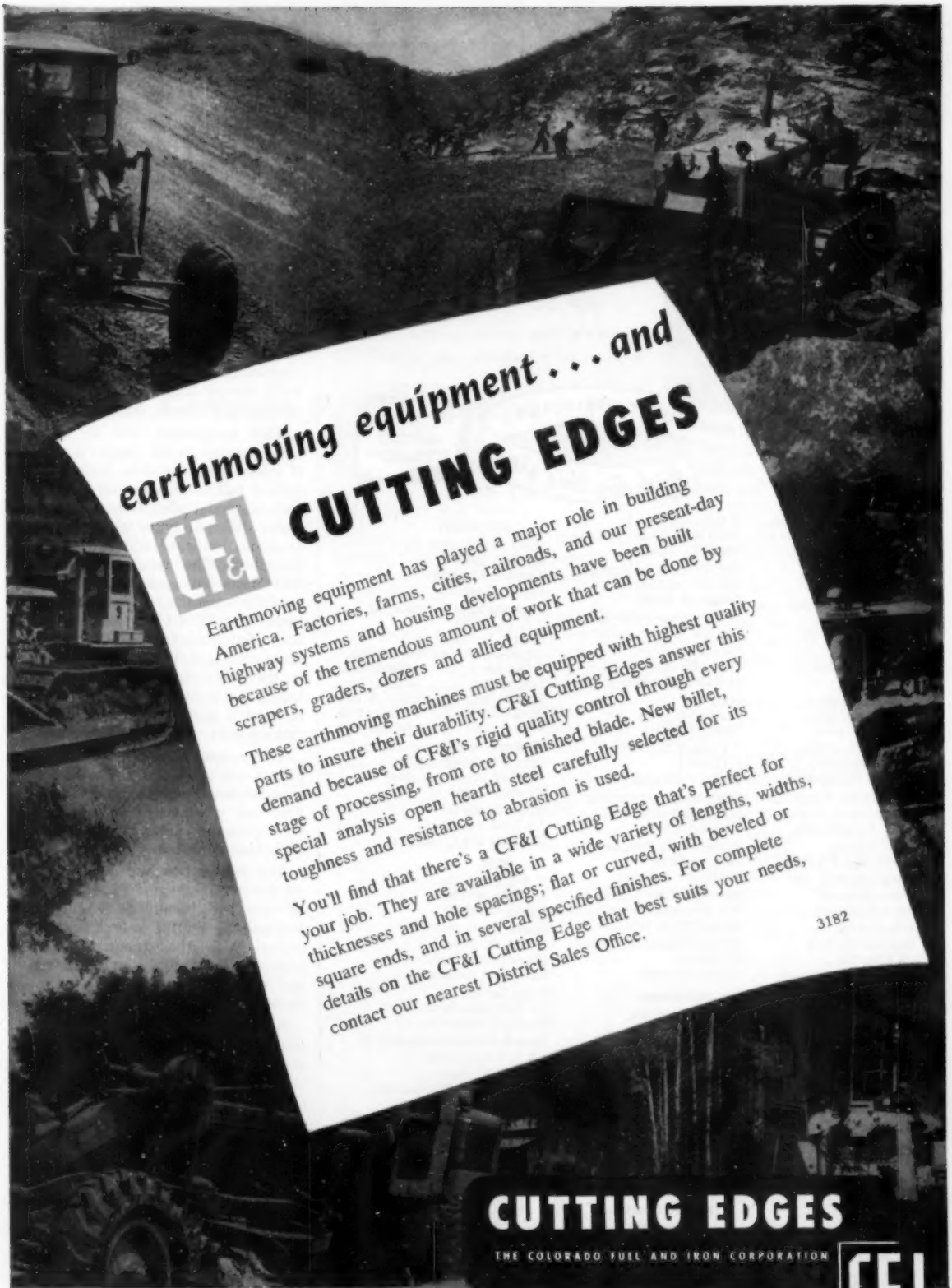
Safeguarding the Public

All excavations which cross or border on paths, walkways, sidewalks, driveways, or thoroughfares must be provided with suitable guardrails or barricades and red lights or torches during darkness. When we have trenches or ditches over which men or equipment are required or permitted to cross they must be provided with walkways or bridges with proper guardrails. When a man falls into a trench 10 ft. deep he lands just as hard as if he had fallen to the ground from a scaffold 10 ft. high. We do a pretty good job in guarding our scaffolds and we must do the same kind of job in guarding our open excavations. If we do not properly shore and guard our excavations we are merely creating "man-traps" and these man made "man-traps" not only trap men, but usually seriously injure or kill them.

We must inspect shoring and guarding daily and must remember that just because an excavation was safe yesterday does not necessarily mean it is safe today. Often a man will remove a brace that he thinks is unnecessary and in his way. Also vibrations, saturations, freezing, thawing, etc., can make short work of changing a safe trench to an unsafe one. We must always be on the lookout for any change that might make one of our excavations a "man-trap."

The same planning and care used in installing shoring must be exercised in dismantling operations. The lower braces should be removed first leaving the upper ones in for protection. All braces must be pulled out cautiously, either by pulling from above or by using screwjacks to take up the strain on wedged timbers and permit their removal. The strain on the jacks should always be removed slowly. Backfilling should be placed and compacted so as to support sides of the excavation before cross braces are removed.

There is absolutely no excuse for anybody being injured or crushed or smothered to death in excavation work. We must plan properly, apply sound engineering principles, and provide reasonable guarding and warnings. We must remember that a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CUTTING EDGES
Earthmoving equipment has played a major role in building America. Factories, farms, cities, railroads, and our present-day highway systems and housing developments have been built because of the tremendous amount of work that can be done by scrapers, graders, dozers and allied equipment.
These earthmoving machines must be equipped with highest quality parts to insure their durability. CF&I Cutting Edges answer this demand because of CF&I's rigid quality control through every stage of processing, from ore to finished blade. New billet, special analysis open hearth steel carefully selected for its toughness and resistance to abrasion is used.
You'll find that there's a CF&I Cutting Edge that's perfect for your job. They are available in a wide variety of lengths, widths, thicknesses and hole spacings; flat or curved, with beveled or square ends, and in several specified finishes. For complete details on the CF&I Cutting Edge that best suits your needs, contact our nearest District Sales Office.
3182
CUTTING EDGES
THE COLORADO FUEL AND IRON CORPORATION
CF&I
Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Casper • Chicago • Denver • Detroit
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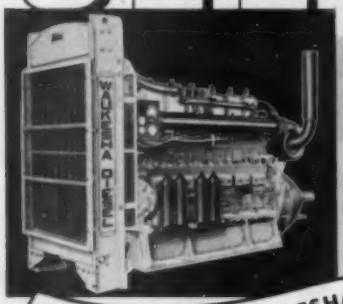
. . . for more details circle 192, page 16

SEE your WAUKESHA DISTRIBUTOR



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UP TO 1135 HP

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Montreal 9, Quebec

WAUKESHA MOTOR COMPANY, Waukesha, Wisconsin • New York • Tulsa • Los Angeles

. . . for more details circle 272, page 16

slice of earth is not always as solid and stable as it looks and the quicker we get an excavation such as trench or ditch backfilled the better off we are because the longer we leave a trench or ditch open the odds increase, in direct proportion, that we're going to have an accident. We must continually inspect our excavations with the thought in mind that it takes very little change for a safe excavation to become a "man-trap."

Symposium on lateral load tests on piles

Symposium on Lateral Load Tests on Piles (STP 154) March 1954, and Supplement (STP 154-A) January 1955. 104 pp and 48 pp, respectively; heavy paper covers; 6 x 9.

This symposium and its supplement present in ten papers a wealth of information and data derived from tests of full sized piles and laboratory tests on model piles. Behavior of piles under different types of loading and in many kinds of soil conditions is described. The results of most of these tests have not been previously published and the symposium is sponsored by ASTM Committee D-18 on Soils for Engineering Purposes to make the actual test data available to the engineering profession. It is hoped the studies will lead to the development of standard procedures for making tests of this type.

The original symposium of eight papers was presented at the 56th Annual Meeting of ASTM, June 1, 1953. The two papers in the supplement were presented June 16, 1954 at the 57th Annual Meeting.

The information and data presented are of great value to the science of soils and foundation engineering and will be helpful to engineers concerned with the design of dams, water-front structures, buildings, silos, and other structures resting on pile foundations.

Because the original symposium has had substantial distribution, copies of the supplement may be obtained separately at $1.50 each. Copies of the symposium and the supplement are available at a combination price of $2.75 from American Society for Testing Materials Headquarters, 1916 Race St., Philadelphia 3, Pa.

• Slag Bituminous Concrete Tables. Small pocket-size booklet of handy data issued by the National Slag Association, of interest to engineers and contractors. Available without charge on request to the Association at 613 Perpetual Building, Washington 4, D.C.

KNOCKIN' Out the Yardage

Another Concrete Paving Record

A NEW record for concrete paving in Pennsylvania was recently established by the Williams Paving Company on the northeastern extension of the Pennsylvania Turnpike System. The Williams Company poured 82,950 sq. yd. of 10-in. reinforced concrete pavement in 23 10-hour working days.

As described in *Highway Builder*, the rapid job was done on Section 37-D in Kidder Township, Carbon County by the Williams Paving Company, Norfolk, Va., for the Lycoming Construction Company, Williamsport, Pa., the general contractor.

All of the work on the 3.63 mile project was done in June and consisted of two dual lanes, each 24 ft. wide. Three of the working days were not complete days because of breakdowns and moving equipment from one lane to another. The average pour was 3606.78 sq. yd. per 10-hour day. The top day was 4,533 sq. yd. or 1,700 lin. ft. put down.

Turnpike commission engineers granted permission to the company to pour concrete in one 24 ft. width instead of in two 12-ft. lanes. Used on the job was a Multifoote 34-E dual-drum paver, which deposited concrete for the mesh strike-off. This was followed by a Multifoote 34-E single drum paver which poured to give the final finish. A Blaw-Knox spreader and two Jaeger finishing machines followed by a Koehring longitudinal float were also used.

The batch haul on the job averaged 2.3 miles from the batch plant to the center of the job. A total length of 3.83 miles to the far end of the project.

E. V. Williams, president of the paving firm points to the supervisory work of Edward L. Williams, vice president; Felton E. Reekes, superintendent; William Boxley, assistant superintendent in charge of fine grading and form setting; and Clyde Biers assistant superintendent in charge of concrete paving.

Civil engineer salaries up 8.2% in two years

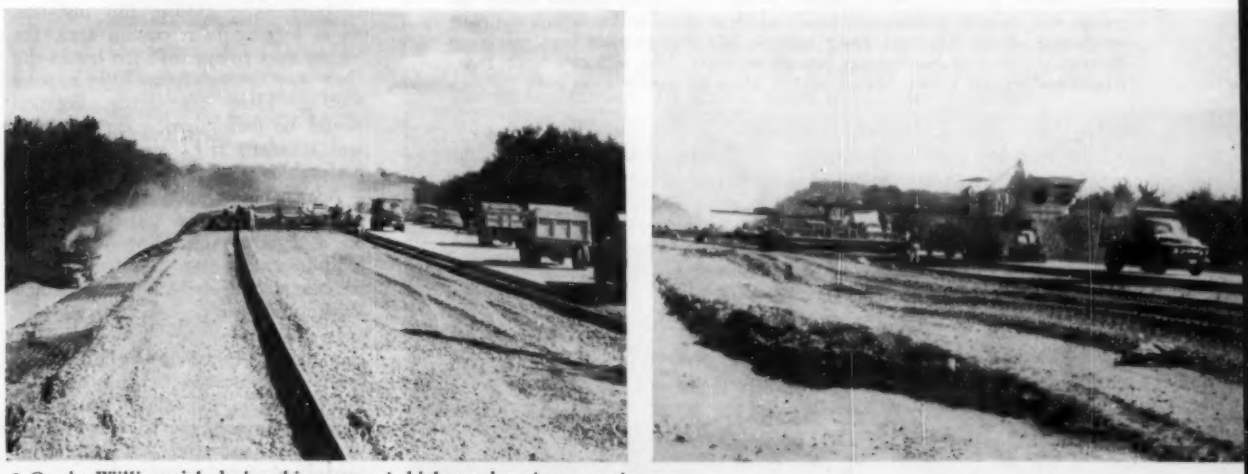
A continuing increase in salaries, averaging in the past two years 8.2% for medians in all professional grades in civil engineering, with a high of 11.1% for one grade, is reported by the Committee on Salaries of the American Society of Civil Engineers.

The Committee, a unit of the Society's Department of Conditions of Practice, is in continuous study of the subject and issues reports biennially.

In the 1955 report the statistics are "accepted as gratifying evidence that men with long experience are receiving better recognition than was the case in previous years."

Nine grades have been classified by the Society. A survey was made on a sampling basis with a questionnaire to 1,087 representative employers of engineers in the fields of consulting engineering, construction, railroads, industry, public service and engineering education.

Data representing 57,186 engineering employees in 401 answering organizations, came from 102 consulting firms with 7,070 engineering employees; 34 construction firms with 1,576 engineering employees; 29 railroads, utilities and industries with 4,184 engineering employees; 38 State highway departments with 35,785 engineering employees; 84 other governmental agencies with 4,045 employees; 113 educational institutions with 4,526 engineering employees.



● On the Williams job during this company's high-speed paving operations.

Tractor Shoes Right for Your Job

(From Caterpillar Tractor Co.)

HOW important is it for the earthmoving contractor to choose the right width of track shoes for his track-type tractors?

It may mean the difference between making five payload trips instead of four with a crawler-scraper unit — of being able to push-load a 20 plus cubic yard capacity scraper to a heaped load, with one track-type tractor, instead of having to call upon another tractor for a helping boost — of staying on top of the ground surface and doing the job efficiently instead of sinking in and bogging down.

What causes the track shoe to have such an influence on work efficiency? Traction is the answer! Traction that has been described as being influenced by the strength of the soil more than any other soil characteristic. Here are some interesting facts to remember about soils when considering what type of shoe is best suited for the work a track-type tractor will be doing.

● Need wider shoes here. Plastic soils, combined with loose or soft ground surfaces, can slow down a tractor unless it is equipped with wide shoes for maximum flotation. This often means the difference in the number of pay loads a tractor-scraper combination can make in a working day.

● Narrow shoes best here. When a track-type tractor is to be assigned to a definite type of work, it will pay the contractor to take note of the ground surface the tractor will traverse to determine which width of shoes will give him the most satisfactory service. On hard, rocky surfaces, like that pictured here, maximum flotation is a distinct disadvantage because narrower shoes will give better penetration and provide a shear surface against which the grousers can pull.

Basically, there are two principal types of earth surfaces with which the contractor comes into contact. One is plastic soil, such as clay, which is composed of fine particles bound together into a cohesive mass under normal moisture conditions. The other is frictional soil, such as sand, which is composed of particles larger and less cohesive, even when wet. Depending on which of the two factors is the more predominant, cohesion or friction, the soil is more or less sensitive to ground contact or ground pressure.

Plastic soils tend to have sufficient shear strength, regardless of vertical load, to permit the use of wider tracks for better traction and improved flotation. On the other hand, the shear resistance of frictional soils increases as weight increases per unit of track area in contact with the ground.

Traction without good flotation is useless. Flotation depends not only on ground pressure but also on the form and shape of the area under the tracks.

How does this affect the choice of track shoes? It should be remembered that the shear area of the track can best be varied by changing the track width. Before allowing for the requirements of flotation and steering, the following general rules can be applied.

For all-purpose operation — standard track shoes.

For operation on plastic soils — wider shoes.

For operation on non-plastic soils — narrower shoes.

In the case of the latter, flotation rather than traction may often be the deciding factor.

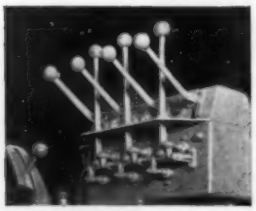
Special jobs also have a definite bearing on determining the best width of track shoe to use. For instance, when logging in a certain area, the logger may prefer that the tracks dig their way through forest litter to solid footing. Here maximum flotation would be considered a disadvantage and standard track shoes would be preferable.

Rock work is another place where maximum flotation would be considered a disadvantage. Narrower shoes tend to gain better penetration and provide a shear surface against which the grousers can pull.

In most cases, then, it will pay the earthmoving contractor in dollars and cents of more work accomplished in less time if he will take notice of the terrain his track-type tractors will be working on and select his track shoes accordingly.

15-ton MICHIGAN TLDT-20 at work near George Washington Bridge, N.Y., N.J.

Air controls mean more profits . . . with this MICHIGAN 15-ton truck crane



It's faster: AIR CONTROL

For smooth swing, for perfect "feel" of the load, MICHIGAN air control has no equal. It cuts operator fatigue.

It's smoother: DISC CLUTCH

For positive action — smooth, and as fast or slow as you want — the MICHIGAN air-controlled clutch is ideal. Self-ventilating, self-cleaning — and interchangeable segments make easy servicing.

. . . for more details circle 188, page 16

A few years ago, only heavy off-the-highway trucks had power-steering. Today, power-steering is practically standard equipment on all passenger cars. Similarly in the excavator-crane field: almost all big machines (1 yard and up) have long been power-controlled. But of ten leading ½-yard machines on the market today, *only three have power-controlled clutches.*

Now consider this: Air-controlled clutches have always been standard on all Michigan® excavator-cranes. Easier to operate and easier to maintain than old-fashioned mechanical levers and linkages, Michigan air controls give you faster production with less maintenance. In short, more profitable operation.

The Michigan TLDT-20—½-yard 15-ton truck crane—features air controls as standard equipment, along with other "big machine" features: 6 adjustable hook rollers, integral-cast turntable deck and sides frames, heavy-duty 404 cubic inch truck engine. The TLDT-20 is described in detail in Bulletin 1600A; write for it and make your own comparison. Or ask your own Michigan distributor to show you, on-the-job, how the TLDT-20 can boost your profits.

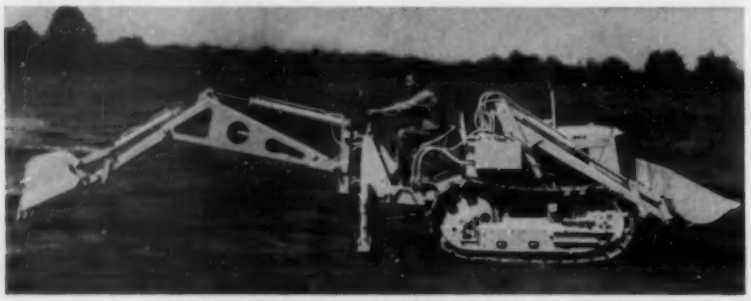
ALL Michigan equipment is available on a low-cost, no down-payment Lease Plan; write for 4-page folder which explains how it works, how much it costs, etc.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
394 Second Street, Benton Harbor 32, Mich.
Phone: WA. 6-6184

What's New
in Equipment and Materials

Reader Service Coupon on Page 16



Jet Trencher Attachment on Oliver OC-3 Loader

Trencher Attachment For Tractor

A new all-hydraulic attachment, called the Jet Trencher, is being offered by The Oliver Corp., Dept. 3T, 400 West Madison St., Chicago 6, Ill., for use with the Oliver OC-3 loader. It features a unique 2-point hitch that permits the operator to hook up or remove the trencher in 90 seconds, and without leaving the tractor. With the trencher detached, the 2-point hitch holds the counterweight for front end loader, or takes a number of handy attachments such as scarifier bar, grader blade, logging tongs, etc.

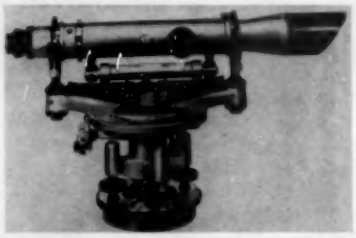
The Jet Trencher digs to a depth of 12 ft., lifts to 11½ ft. and clears 7½ ft. for easy loading of high trucks. Two dipper sticks are available: the longer stick is for digging in moderately heavy soils at depths to 12 ft.; the shorter one handles extremely tough conditions, like clay, and digs to 10 ft. Various bucket sizes are available.

For more information circle 106 on Service Coupon Page 16 and mail now.

Convertible Level Has New Features

The new 1955 Model 40 convertible level of Warren-Knight Co., 136 N. 12th St., Dept. F, Philadelphia 7, Pa., has eight additional features at no increase in price.

A new cast brass internal focusing telescope is completely sealed against dust and dirt, and employs 24 power coated optics with cross wires on a glass reticule. New time-saving features include a circular level mounted on the top plate cover, which enables a quick check on the instrument set-up, and a fast level position approximation. Possible

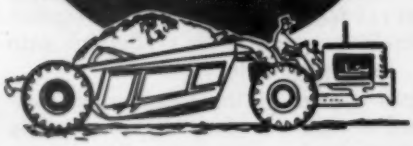


New 1955 Model 40 Convertible Level

When You Specify Southern Tire Retreading

NO TIME LOST!

BIG MONEY SAVED!



NO TIME LOST . . .
Because Southern Tire representatives pick up and return your tires at your job site after work hours, assuring no costly equipment downtime.

BIG MONEY SAVED . . .
Because Southern Tire Retreads are guaranteed to equal new-tire mileage—at half the cost! Southern Tire's giant three-sectional molds (standard with U. S. Army) are fitted to the tire, instead of tire being cut down to fit mold. Finished retread has as much rubber in the lugs as a new tire and more undertread than any rock service tire.

CHOICE OF ROCK SERVICE, TRACTOR TYPES, OR RIB TREADS TO SUIT YOUR PARTICULAR JOB.

All Sizes from 1100x24 to 2700x33. Also new sizes 29.5x25 and 29.5x29. Call Your Favorite Dealer and Specify Southern Tire Retreads.

SOUTHERN TIRE COMPANY

312 - 316 S. COURT STREET
FLORENCE, ALA.

PHONE COLLECT
Florence 85 or 86

. . . for more details circle 259, page 16

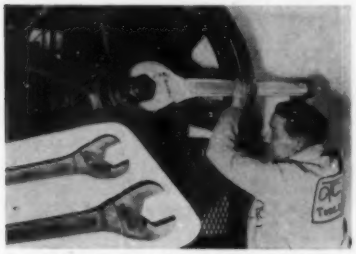
sources of maintenance have been eliminated by adding a nylon pinion bearing, a steel center, and a level bar cast in one piece with the circle cover. A cover glass protects the circle and vernier graduations.

Especially interesting is a new eyepiece cap with a resetting scale that enables the user to quickly reset to his individual need without even using the telescope.

For more information circle 107 on Service Coupon Page 16 and mail now.

Adjustable Wrenches Replace 42 Fixed Sizes

Slim-Twin adjustable wrenches, announced by Owatonna Tool Co., 435 Cedar St., Owatonna, Minn., are claimed to offer both economy and versatility. Two Slim-Twin wrench sizes with jaw settings in ⅝ in. and 1/16 in. graduations can handle an adjustment range from 1⅝ in. to 4⅝ in. It is stated that normally it would require at least 42 cumbersome carbon steel fixed sizes wrenches to cover a comparable range of sizes. Slim-Twin jaw design, in addition, provides ready access to tough jobs and the wrenches occupy only a fraction of the storage space needed for an equal assortment of fixed size wrenches.



Slim-Twin Adjustable Wrench

Drop forged from high quality alloy steel the 24 in. length wrench is rated to withstand 3500 ft. lb. of torque. The larger 36 in. length wrench is rated to withstand a torque load of 10,000 ft. lb. The safety factor is emphasized by firmly securing each adjustment with a nut and bolt eliminating the hazard of adjustment slippage.

For more information circle 108 on Service Coupon Page 16 and mail now.

Improved Snow Plow Wax

A new grade of "Snow-Rem" snow plow wax expecially formulated for application in sub-zero temperatures has been announced by Speco, Inc., 7308 Associate Ave., Cleveland 9, Ohio. Because it contains new, special fast acting, non-freezing dryers, this "sub-zero" wax is said to permit on-the-job use under the most adverse weather conditions.

Suitable for both brush and spray applications, Snow-Rem possesses a high Carnauba wax content, and in addition, contains a silicone additive that produces an extra slippery surface coating and possesses unusual adherence qualities. It is said that the coating of plow blades,

ROGERS TRAILER DUO in 140 Ton Haul

The "know how" required for the moving and installation of heavy industrial products requires a knowledge of the characteristics and adaptability of the equipment used as well as the "tricks of the trade."

For the handling of this 140 ton transformer for the New York Consolidated Edison Company, Gerosa Haulage Company of New York, chose from their fleet of 20 Rogers Trailers these two 80 ton units.

The transformer was moved in by barge, picked up by a lighter derrick and placed astride the two Rogers trailers which hauled them to the power plant. An ingenious operation by master haulers and erectors.

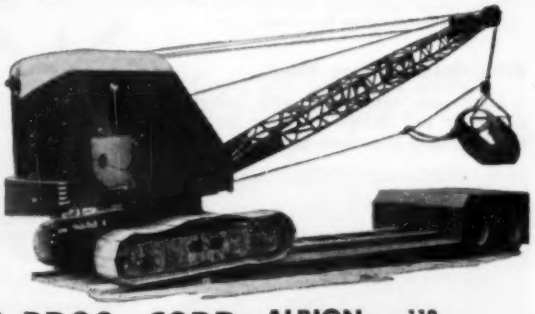
By reason of repeated instances such as this over many years, Rogers Trailers are identified with a majority of such difficult and interesting heavy moves.

Get the interesting, illustrated catalog.

EXPERIENCE builds 'em

ROGERS Heavy Duty Gooseneck Trailers

PERFORMANCE sells 'em



ROGERS BROS. CORP. ALBION, PENNA. 110 Orchard Street

Export Office: 50 Church St., New York 7, N.Y., U. S. A. — Cable Address: Brosites

A Rogers Type "D" Trailer

. . . for more details circle 255, page 16

moldboards and wings with wax can increase daily plowing mileages by as much as 30 percent. Snow-Rem is available in one and 5-gallon cans and in 55-gallon drums.

For more information circle 109 on Service Coupon Page 16 and mail now.

Road Roller with Power Brakes

The first application of power brakes to 3-wheel road rollers has been announced by the Buffalo-Springfield Roller Co., Springfield, Ohio. Tapered roller bearings on both the guide and drive rolls, providing true rolling motion, easy adjustment and minimum maintenance, are also standard equipment on the company's new 10-14 ton and 12-15 ton heavy-duty variable weight 3-wheel rollers. The vacuum hydraulic-powered brakes on both the drive rolls, and a mechanical parking brake mounted on the transmission, provide complete and positive braking control at all times and under all conditions. Purchaser has choice of standard 4-speed transmission or torque converter drive.

Buffalo-Springfield's Heavy Duty Roller with Power Brakes and Tapered Roller Bearings.

Other features of these new rollers are of the well known types and quality previously established by the company.

For more information circle 110 on Service Coupon Page 16 and mail now.

Bituminous Paving Plant

Bituminous mixes made with cold dry aggregate and heated bitumen are being produced in a new stationary plant added by White Mfg. Co., Elkhart, Ind. to its line of hot plants. The illustration shows new Model LC-40 in operation by United Bituminous Materials Co., at Westville, Ind., John Fisch, Proprietor.

Model LC-40 Asphalt Plant

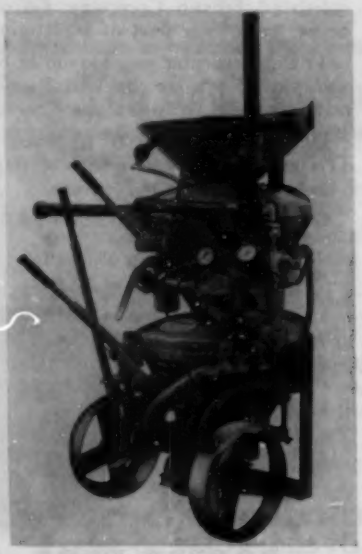
New model has capacity of 40 to 50 tons per hour. It consists of twin axle pug mixer, 2 compartment aggregate bin with recombining hopper, weigh scales for aggregate and for bitumen, bucket elevator and 2 bin reciprocating feeder with adjustable gates. Discharge gates of storage bins, hopper, and mixer are air operated. One engine or electric motor drives entire plant. One man runs plant, with a helper to supply material to the feeder.

In the United plant pregraded aggregate and sand are used. Separation is maintained by feeder gates and by 2-way flapper at top of elevator. A vibrating screen can be placed above storage bins. Genuine hot mixed asphalt can be produced when using dryer for heating aggregate.

For more information circle 111 on Service Coupon Page 16 and mail now.

Concrete Placing Machine

A new concrete placing machine, the Airplaco-Nucretor, added to the line of Air Placement Equipment Co., 1009 West 24th St., Kansas City 8, Mo., is designed for use in operations where larger quantities of concrete are to be placed. The complete range of operating capacities is stated to make it possible to use this piece of equipment for all types of jobs from large to small. It has a maximum operating capacity of 6 cu. yd. of aggregate per hour with a complete range of capacities from ½ to 6 cu. yd. per hour.



Airplaco-Nucretor

It is stated to be possible to gun extremely wet materials with the Nucretor due to the design of the slide valves which allow the materials to pass from the upper hopper into the lower hopper. Exceptionally large clearance in the feed mechanism permits larger operating capacity without increasing the over-all size of the machine. The ball-type slide valves are easy to operate and have their own pressure seals. Among other features of the Nucretor are: readily accessible controls; easy maintenance and clean-up after operation; light weight. The Nucretor, like the Airplaco Bondactors, can be used to place all types of gunnable aggregates as well as for wet or dry sandblasting.

For more information circle 112 on Service Coupon Page 16 and mail now.

New Line International Trucks

A new line of International trucks that combines style-setting design with new, rugged power and durability has been announced by the motor truck division of the International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. Designated the S-line, the new models include a wide and complete range of four and six-wheel gasoline and LPG-powered motor trucks ranging in gross vehicle weight rating from 4,200 to 33,000 lb.

S-line models range from the light-duty S-100 series through the heavy-duty-S-180 series. The line includes a wide range of pickup, panel, stake, and multi-stop delivery models with factory-mounted, added-capacity bodies; farm trucks, Roadliner truck-tractors, and other conventional chassis models for medium and heavy-duty hauling requirements in general or specialized fields; five cab-forward models; fire truck, school bus, and four and six-wheel Loadstar dump-truck chassis; and three four-wheel-drive models including a new light-duty S-120 (4x4) rated at 7,000 lb GVW.

International S-120 Pickup Trucks

For more information circle 113 on Service Coupon Page 16 and mail now.

Highway Tire for Trucks

A new "Super Expressway" highway tire has been announced by The General Tire & Rubber Co., Akron, O. Tread on the new casing runs 12 to 15 percent wider and deeper than the "Expressway" line which it supercedes.

With a tread design similar to the Expressway, the "Super" is available in both standard carcass construction and Nygen. More and longer side vents are built into the shoulders of the tire for better heat radiation and cool running.

For more information circle 114 on Service Coupon Page 16 and mail now.

Contractor uses three

ADAMS "660s"

to speed tough grading jobs on Ohio Turnpike...

• The Cook Construction Company of Jackson, Miss., is building a 12-mile stretch of the Ohio Turnpike, near North Royalton. For the tougher grading operations on this job they are using three of their 140 hp. Adams "660" Motor Graders.

Commenting on the performance of the "660," Cook Company operator, James Smith, says, "This machine will do everything any grader will do and a lot more. It has more weight and power and higher speeds, both forward and reverse."

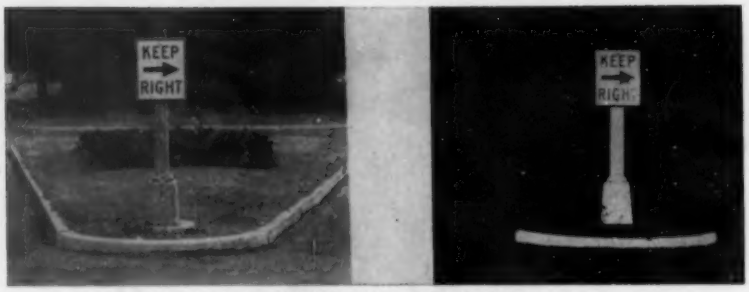
Another Cook Company operator, Robert Ault, says, "The '660' is the best machine I have ever operated. It has the power, weight and speed to handle toughest jobs—even grading in rock where it is actually shovel work."

You'll find the Adams "660" capable of doing up to 30% more work than any grader you have ever used. Ask for complete information on this great machine—today!

A Product of Adams Division
LeTourneau-WESTINGHOUSE Company, Peoria, Illinois
Subsidiary of Westinghouse Air Brake Company

ADAMS

Motor Graders TraveLoaders Pull-Type Graders



Day and Night Views of Traffic Sign

Reflective Paint Makes Traffic Hazards Visible At Night

A new reflective liquid which can be painted or sprayed directly on the surface, announced by Minnesota Mining and Manufacturing Co., makes possible overall reflectorization of traffic hazards and obstructions to make them brightly visible in nighttime. Called "Codit" brand reflective liquid (no. 7210), it is specifically designed for application to wood, concrete and other rough or porous materials.

It is recommended for overall reflectorization of median dividers, underpass abutments and walls, safety islands, curbings, telephone poles, trees, fire hydrants, guard rails and posts and other objects where nighttime visibility means safer driving. The new reflective liquid is applied to any porous surface with a brush or conventional spray equipment. It makes the entire object visible at night by brightly reflecting auto headlights.

Further information can be obtained by writing Dept. 5-271G, Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.

For more information circle 115 on Service Coupon Page 16 and mail now.

Air-Cooled 13 H.P. Engine

A new two-cylinder, air-cooled gasoline engine — Model CCK, announced by D. W. Onan & Sons Inc., University Ave. S. E., at 25th St., Minneapolis 14, Minn., is claimed to be the most compact, 2-cylinder engine of its horsepower range on the market today. Its opposed-cylinder design is stated to lend itself to applications where smooth running performance is essential and where installation space is at a premium.

Model CCK Onan Engine.

Fundamentally, the Onan CCK engine is a two-cylinder, horizontally-opposed, 4-cycle, air-cooled engine rated at 12.9 H. P. (corrected BHP with accessories) at 2700 RPM. It is gasoline driven, has a 3¼ in. bore, 3 in. stroke, 50.0 cu. in. piston displacement and the compression ratio is 5.5:1. It weighs 148 lbs., dry, with standard accessories. Piston speed is 1350 fpm at 2700 RPM. It is 19⅝ in. high and 14⅝ in. long.

For more information circle 116 on Service Coupon Page 16 and mail now.

Giant Fluorescent Street Light

Development of the world's largest fluorescent street light — designed specifically for use on the nation's widest urban throughfares, has been announced by General Electric's Outdoor Lighting Department, Lynn, Mass. Designated the Form 1206, the giant fluorescent luminaire employs 12 6 ft. rapid start lamps and generates more than 64,000 lumens, three times the light output of the largest existing fluorescent luminaries.

The first application of the giant fluorescent will be by the Indianapolis Power & Light Co. on 110 ft. wide Washington St. and Monument Circle in the heart of Indianapolis. A total of 150 luminaries will be mounted on 33 ft. high davit type poles.

The luminaire is mounted on a pipe tenon entering about 3 ft. through a slip-fitter casting. Termination of the pipe is in another casting so arranged to permit a leveling adjustment of three degrees. Air is drawn in through the bottom of the globe to a central chimney running the length of the unit. Other openings permit outside air to enter for cooling of the ballasts mounted about the lamps. Top vents help to exhaust the air. All openings are covered with either fine-mesh screens or perforated metal to exclude insects.

For more information circle 117 on Service Coupon Page 16 and mail now.

Portable High Capacity Space Heater

A new oil-fired portable Summeraire space heater developed by Clayton Manufacturing Co., El Monte, Calif., has a capacity of 300,000 BTU's per hour and delivers 2400 cu. ft. of high velocity heated air per minute.

The Clayton Summeraire is a compact, jet action "furnace on wheels" which throws a continuous stream of heated air over a considerable distance. Burning 2.15 gal. of cheap No. 1 or No. 2 fuel oil or kerosene per hour, its 25 gal. fuel tank allows it to operate at full blast for 10 hours without refilling.

Three Summeraire models are available. All models have the same standard specifications and features. Model H-300 is equipped with electric drive, and requires a source of 110V. 60 cycle A. C. Current for its operation. Model HM-300 is equipped with gasoline engine drive, requires no electricity for its operation and can be used anywhere. Model HTC-300 is the same as H-300, except that it comes equipped with automatic thermostatic control. Equipped with a remote thermostat which can be located anywhere, the burner goes "off" and "on" to maintain a preset temperature. BTU output and fuel consumption rates are identical for all three models.

New Summeraire Space Heater

For more information circle 118 on Service Coupon Page 16 and mail now.

New Snow and Ice Melter

Walton-March, 1935 Sheridan Rd., Highland Park, Ill., has introduced a product under the name "Ice Foe," designed for the melting of snow or ice on sidewalks or elsewhere as needed. Its operation is by exothermic action, the immediate development of heat on contact with moisture.

This chemical, which comes in the form of small pallets, is said to be absolutely non-toxic to humans or animals, non-injurious to grass or other vegetation, non-damaging to concrete or asphalt, and without unsightly after-effects, in the form of marks or residues where used. Laboratory reports are available on request. Package sizes are 10, 25, and 100 lbs.

For more information circle 119 on Service Coupon Page 16 and mail now.

3/8 Cu. Yd., 6-Ton Shovel Crane

A new self-propelled 3/8 cu. yd., 6-ton shovel-crane, Bantam Model CR-35, has been announced by Schield Bantam Co., Park St., Waverly, Iowa.

The new Bantam features 12,000 lb. lifting capacity, and an outside turning radius of 19-1/2 ft., which gives it extreme maneuverability for getting into tight working quarters to handle heavy loads. Another important feature is two-

Why the new "81" Bituminous Plant will let you underbid your competitors

● Portability and Performance. There's the answer.

First let's consider portability. The 81 consists of two main units, each complete on its own pneumatic-tired chassis, ready to pull in or pull out at a minute's notice. No holes to dig, no special alignment necessary. Just pull in, hook up, lay pipes, and go to work.

Those plant-hours and man-hours you'll save on each move count up *fast* in dollars and cents.

Continuous, non-stop flow

Now let's examine performance. The steady, uniform, uninterrupted flow of material from the 81 keeps your trucks busy. You vary the mix by remote control of the bitumen pump or by adjusting the gates on the aggregate feeder without stopping the plant. Clam gates on the discharge hopper load your trucks without segregation, cutting off the flow when trucks pull in and out—again without slowing the plant. This famous *Continuflo* operation gives you more yards a day . . . *low cost* yards, too.

All mixing is fully automatic, for the asphalt metering pump is interlocked with the aggregate feeder to *guarantee* exact proportioning. There can be no variation. The human element is out, and correct proportioning is certain.

Other features

Other important PIONEER features include an auxiliary air inlet in the drier to provide extra air to carry off excess moisture . . . 90% efficient multiclone dust collector . . . pre-mix chamber where hot, dry aggregates are mixed *before* bitumen is added . . . heavily insulated bitumen tank which cuts heat loss . . . patented anti-caking pugmill . . . and central location of all gauges, indicators, and control lever to permit control of entire mixer unit from a single platform. The entire plant is driven by electric motors with central-station push-button control.

Stout construction—quality fittings

Certainly, the extra heavy welded construction and use of the best pumps, bearings, and fittings obtainable have added a little to the manufacturing costs, but the next time you seek a blacktop job, just consider the 81 . . . and how it will let you turn in a lower bid.

Want details? Write Pioneer Engineering Works, Inc., Minneapolis (subsidiary of Poor & Company, Chicago) or nearest PIONEER Distributor.

	MODEL 51	MODEL 81	MODEL 101
First Unit	Mixer and gradation screen with 3-compartment bin	Mixer and gradation screen with 3-compartment bin	Mixer and gradation screen with 3-compartment bin
Second Unit	Drier, dust collector and burner	Drier, dust collector and burner	Drier
Third Unit	—	—	Dust collector
Auxiliary Units	Feeder elevator (with necessary feeder), hot elevator and fines feeder (if desired)	Feeder conveyor (with necessary feeder), hot elevator and fines feeder (if desired)	Feeder conveyor (with necessary feeder), hot elevator, burner and fines feeder (if desired)
Rated Cap.	40-60 yds./hr.	60-80 yds./hr.	80-110 yds./hr.
Total Wt. (Approx.)	68,000 lbs.	86,500 lbs.	125,000 lbs.
Approx. HP Req. (Elec.)	100	143	200

Pioneer
Continuflo EQUIPMENT

Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn.
Subsidiary of Poor & Company • Chicago
Please send information on equipment checked.

☐ GRAVEL PLANTS ☐ WASHING PLANTS ☐ MECHANICAL FEEDERS
☐ ROCK PLANTS ☐ BITUMINOUS PLANTS ☐ VIBRATING SCREENS
☐ JAW CRUSHERS ☐ APRON FEEDERS ☐ BUZZER SCREENS (LIGHT DUTY)
☐ ROLL CRUSHERS ☐ ORO FEEDERS ☐ CONTINUFLO CONVEYORS

*Name*_____
*Company*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

. . . for more details circle 276, page 16

Bantam Model CR-35

speed independent travel which allows the operator to work the upper deck machinery and travel at the same time. The steering mechanism and brakes are controlled hydraulically, while the travel mechanism and upper machinery operate on Schield Bantam's fast-action trouble-free mechanical control principle.

The upper deck basic unit features the same Bantam engineering design principles built into the Model T-35 truck, and the Model C-35 crawler models. Power boom hoist, which is standard equipment on all Bantam models, offers power controlled raising and lowering of loads for safer, smoother materials handling operations. The full revolving self-propelled rig has a swing speed of 6.65 r.p.m. 176.5 f.p.m. line speed, and other standard Bantam features such as anti-friction bearings, machine cut gears, internal expanding band type "snap-in" clutches with molded linings, external contracting brakes, and four trunnion rollers and four cam-type adjustable hook rollers to distribute load weight evenly over the trunnion base, cutting load stress and wear to a minimum.

For more information circle 120 on Service Coupon Page 16 and mail now.

Portable Generator for Welding Service

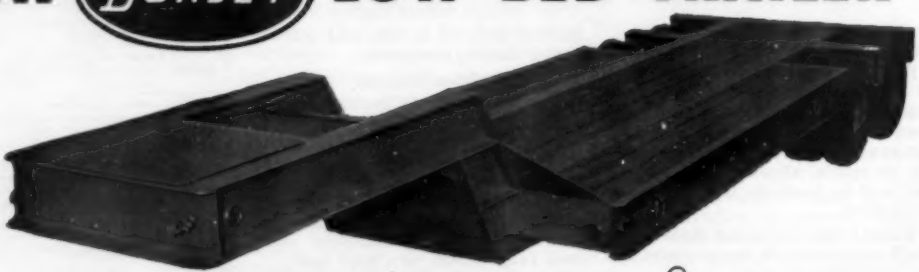
A new lightweight, 2500-watt Onan electric generating plant, designed with special external modifications to operate any transformer type AC welder up to 150 ampere rating, has been announced by D. W. Onan & Sons Inc., University Ave. SE at 25th, Minneapolis 14, Minn.

Designed as a portable source of AC power, the unit combines the new air-cooled Onan model 205AJ-1M, 2500-watt, 115-volt, 60-cycle, AC electric generating plant with any 150 amp. transformer type welder to become a versatile generator-welder "package."

External modifications of the standard

So Light, to be so Strong

THE NEW DORSEY LOW BED TRAILER



Now, a 20-ton trailer weighing only 8,250 pounds cuts operating costs and gives busy heavy haulers more loads within legal limits. High tensile steel main channels and close-spaced all-welded cross members give extra strength to the Dorsey HTS series of low bed trailers also available in 15, 25, 30 and 35 ton capacities. Flat-type gooseneck steps up efficiency and versatility. Wheels in tandem "walk" on stub axles over rough terrain, pull easily on highways under any load.

This tag on your Dorsey gives it exact weight.

Typical loadings show versatility of flat-type gooseneck Dorsey HTS low bed trailers which are delivered ready for work with brakes, recessed lights, tool box as standard equipment. Grader ramps are optional at extra cost.

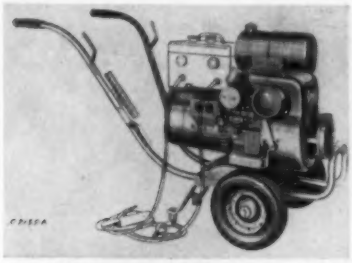
DORSEY TRAILERS SALES-SERVICE

SEE YOUR DORSEY DISTRIBUTOR OR CONTACT

DORSEY TRAILERS ELBA, ALABAMA

... for more details circle 196, page 16

Onan portable electric plant include a convenient 3-pole receptacle for quick plug-in of any transformer type AC weld-



Portable Generator for Welding Service

er. Completely self-contained, this 2500-watt unit weighs only 152 lb. It is powered by an Onan-built, single-cylinder, 4-cycle air-cooled gasoline engine. The generator is Onan-built, 2-pole revolving armature, inherently voltage-regulated type, directly connected to the engine for permanent alignment.

For more information circle 121 on Service Coupon Page 16 and mail now.

Two 35 kw Electric Plants

Two new 35 KW electric plants are being marketed nationally by Kohler Co., Kohler, Wis. One of the plants has a conservatively rated capacity of 35,000 watts of alternating current and is diesel-powered. The other new unit also produces 35,000 watts of alternating current and is powered by gasoline.

All models in diesel and gasoline driven units feature remote-controlled, electric starting by on-off switch at the plant or two-wire remote control. Starting panels are equipped with over-cranking protection. The units are electrically cranked through automotive-type starting which uses a 12-volt starting battery. Wall mounted transfer switches for automatic stand-by operation are available for both models. Standard equipment on all models includes low oil pressure cut-out, high water temperature cut-out, oil pressure gauge, fuel line muffler, battery cables, and lubricating oil filter.

For more information circle 122 on Service Coupon Page 16 and mail now.

Hydraulic Pumps

A new line of five gear type pumps has been announced by Wisconsin Hydraulics, Inc., 3165 North 30 St., Milwaukee 16, Wis. Rated for 1,000 p.s.i. continuous duty, the pumps are made in 5 sizes, with discharge capacities from 8 up to 22 g.p.m.

The compact, easy-mounting pumps are available in a variety of flanges, mountings and portings. Designed and engineered for rugged industrial usage where any dependable source of hydraulic power is generated. Used on truck mounted equipment, building machinery, materials handling equipment, automotive products, farm machinery and many other types of equipment both mobile and stationary.

For more information circle 123 on Service Coupon Page 16 and mail now.

DRILLING

to Investigate Underground Conditions

the MOBILE* *way!*

There is a versatile, one-man Mobile Drill costing as little as $1,290. Available with hydraulic or hand feed.

. . . a few of the users of MOBILE DRILLS:

- *Arkansas Resources & Development Commission
- *Board of County Road Commissioners (Grand Rapids)
- *Delaware Geological Survey
- *S. J. Groves Constructions
- *Peter Kieweit and Sons
- *Moss-Thornton Company, Inc.
- *Western Contracting Co.
- *Williston Shell Rock Co.
- *80% of State Highway Departments.

There's nothing like a Mobile Drill—for low original cost—for versatility—and for maneuverability. Mounted on a Jeep or a 4-wheel-drive truck, the rugged, lightweight Mobile Drill can be transported over roughest terrain.

It's better to be safe—rather than sorry when making a bid. It costs so little with a Mobile Drill. Be sure—get your sub-soil information the Mobile Drill way! Write for full information—no cost or obligation.

* *World's Largest Manufacturer of Light Vehicle Powered Drills*

MOBILE DRILL

MOBILE DRILLING, INC.
961 NORTH PENNSYLVANIA STREET
INDIANAPOLIS 4, INDIANA

. . . for more details circle 246, page 16

Dragshovel Has Cambered Boom

Greater digging depth, digging radius and digging force plus easier dumping are advantages claimed from the cambered boom now being offered by Bucyrus-Erie Co., South Milwaukee, Wis. for 10-B, 15-B, and 22-B dragshovel service. The efficient front-end design is stated to be particularly useful in digging sewer trenches, basements and pipelines or conduits as well as for other utility and small contracting jobs.

B-E Dragshovel

Heavier boom contributes to a powerful digging stroke. Cambering of the boom allows extra room for digging over corners of the crawlers. As a safety feature, the dragshovel can be positioned further from the edge of embankment.

The dipper design has also been changed to provide more heel clearance, an increased slope to dipper sides for cleaner dumping, a longer lip which digs in easier and offers a longer shelf for heaping higher loads, and side cutters with straight cutting edges which offer less resistance to penetration. In addition, the dipper can be raised higher and brought in closer without spillage. A deflecting sheave on under side of boom prevents dipper from going into toggle.

For more information circle 124 on Service Coupon Page 16 and mail now.

Shot Hole Drill Head

The Pengo fish tail screw bit has been added to the line of earth boring tools of Petersen Engineering Co., Santa Clara, Calif. It is available in ten sizes of drill

Pengo Fish Tail Screw Bit

heads ranging in diameter from 2⅛ in. to 10 in. for boring to depths of approximately 300 ft.

This new bit is designed for use with any make of continuous helix type auger for verticle or horizontal drilling of shot holes, wells, or any other purposes for which small diameter holes are required. The new Pengo screw bit attaches by means of a combination drivlug hex or square shank, or a drivlug that welds directly to the bottom of the flight so that any type of flight may be fitted.

For more information circle 125 on Service Coupon Page 16 and mail now.

Improved Method of Marking Surveying Stakes

A new kind of grading marker, developed by W. D. Hargus, a surveyor of Brawley, Calif., is a heavy resistant paper sleeve which is placed over a stake. The sleeves are clearly marked graphically so that the excavating operator can read them as far as 600 ft. away.

Because the markers have varying border widths which give the amount to be cut or filled, errors of judgment are eliminated. The excavator operator can check the amount to be cut or filled by glancing at the marker instead of relying on his memory or getting off the equipment and checking the lumber crayon marked stake.

A border of black at the bottom of the marker designates the fill wanted and the top of the border indicates the finished grade. The marker used to designate fill has an "F" at the top in black on a white background. Under the "F" is a numeral indicating in increments of tenths of feet how much is to be filled.

Cut markers are marked at the top with a "C" and also use a border to designate graphically the depth of cut at the stake. Obviously, the finished grade cannot be indicated directly for it is below the surface of the ground. However, the next best thing is done. The bottom of the cut border automatically falls 1 ft. above the finished grade when the bottoms of the markers are placed at the original rod reading elevation. Cut markers are printed in red.

This reference plane is automatically set 1 ft. above the finished grade where cuts are less than 1 ft. If a deeper cut is desired, then a slight modification of this method will produce the same results.

The marker is made of waterproof paper and glue and slips over the regular wooden stake normally used in land leveling. The paper is specially treated to withstand most extreme weather conditions. The markers are open at both ends and slip over a stake forming a paper cylinder or lying flat according to orientation. They are fade resistant and have proved to last from two to three months and still maintain maximum visibility in wind, sun, and water. In extremely windy conditions the markers should be stapled in place.

The markers cost $5 per 100, and can be obtained from Hargus Markers, 501 West H St., Brawley, Calif.

For more information circle 126 on Service Coupon Page 16 and mail now.

Tandem Axle Trailer Dump

A new tandem axle trailer dump, designed for use with single rear axle tractors, has been announced by Galion Allsteel Body Co., Galion, Ohio. The new unit is designated as Model STM Transporter. Designed for materials hauling in localities where weight laws establish a medium gross weight limit and allow credit for only one set of tandem axles, Model STM is reputed to afford excellent stability, both on the highway and in dump position.

Model 2020 STM Transporter with Model 77368 Duo-Scopic Hoist

Available body lengths range from 19 to 24 ft. with payload capacities of 10 to 36 cu. yd. Three optional "Duo-scopic" center mounted, twin telescopic hoists provide lifting capacities from 24 to 34 tons. According to the manufacturer, Model STM Transporters are designed and constructed to provide maximum strength and long service life together with minimum unladen weight. Ten gauge high resistance steel is used throughout the body with closely spaced 4 in. channel crossmembers welded to 6-in. I-beam longitudinals. Tandem "Stabl-ride" or center pivot bridgetype suspension is used on the heavy-duty pressed steel chassis. A complete selection of brake types, axle capacities, tires and optional equipment is offered.

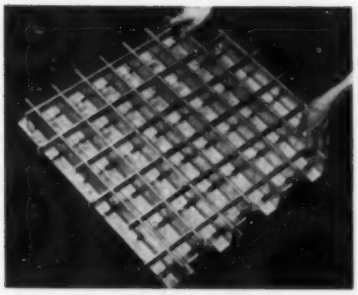
For more information circle 127 on Service Coupon Page 16 and mail now.

T-Bar Grating for Concrete Or Asphalt Filler

T-bar grating, designed for use with concrete or asphaltic filler, is one of the newest products in the complete line of electroforged steel and interlocked grating manufactured by the Blaw-Knox Co., Farmers Bank Building, Pittsburgh, Pa.

Multiple advantages of T-Bar flooring cited by Blaw-Knox include: (1) All forms necessary in pouring a concrete floor are eliminated when T-Bar is used because the "T's" on the underside of the grating form a retaining surface. (2) Bearing capacity is increased because the "T's" are placed close together. (3) Rugged loads can be handled because the surface is armored with the upright cross bars and bearing bars. (4) The over-all deadweight of this type floor is less than that of standard reinforced concrete.

The T-Bar panels can be made up into 3 ft. x 20 ft. sections and cut to the



T-Bar Grating

desired dimension. The "T's" used in construction may be from 1 in. x 1 in. x ⅛ in. up to 6 in. x 6 in. x ½ in., according to bearing strength required for the flooring. The grating is formed by pressure interlocking.

For more information circle 128 on Service Coupon Page 16 and mail now.

Arcwelding Machine Features Constant Arc Voltage

A new Airco 800 ampere TCV rectifier arc welder, announced by Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y., is designed expressly for inert gas shielded consumable electrode welding. The machine features constant arc voltage for all automatic machine welding applications employing constant speed wire feed.

This new arc welder contains a three phase transformer and a rectifier bank. Coils are aluminum wound, silicone and glass insulated, for lightness and protection against high temperatures and moisture. Forced draft cooling is provided by a fan with a reversible ball bearing motor. This reversing feature allows dust and lint to be blown from the rectifier stack.

With this machine the arc voltage may be pre-set over a wide range, from 15 to 44 arc volts. The voltage may also be pre-set to provide a higher initial voltage for ease in establishing the arc. Once the arc is established the voltage automatically adjusts to the pre-set value. This arc voltage then remains constant regardless of load conditions or changes in input line voltage.

For more information circle 129 on Service Coupon Page 16 and mail now.

Loader for Light Tractors

First of a new series for light tractors, the new Shawnee special loader, announced by Shawnee Manufacturing Co., 1947 North Topeka, Topeka, Kans., features a crank shaft driven hydraulic pump. Double acting cylinders provide extreme down pressure and loading height to 9 ft. 48 in. or 66 in. buckets are available. Mounting of the loader on the tractor is extremely simple and it is easily removable. The simple, clean design of the new loader provides the operator with excellent visibility.

Shawnee Special Loader

For more information circle 130 on Service Coupon Page 16 and mail now.

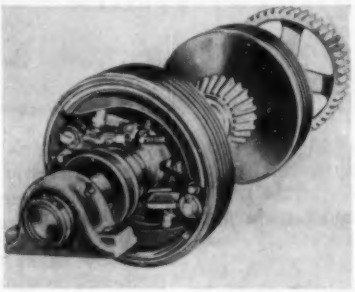
Steam Cleaning Detergent for Soft Water

Clayton K-10 steam cleaning compound, a heavy-duty industrial steam cleaning detergent claimed to have important advantages in efficiency and economy, is a new development of the Clayton Manufacturing Co., El Monte, Calif. An extensive survey showed that many steam cleaner users have available an industrial water supply of 10 grains or less in hardness. On these findings, Clayton developed K-10 to condition 10-grain water while providing the same cleaning action as other Clayton compounds capable of handling 20-grain water. Except for its somewhat reduced water conditioning activity, Clayton K-10 does not deviate in any way from the high quality and performance standards established for existing Clayton steam cleaning compounds.

For more information circle 131 on Service Coupon Page 16 and mail now.

Crane-Excavator Has 15 Engineering Improvements

The incorporation of 15 major engineering improvements in its line of ¾ cu. yd., 5- and 6-ton truck and crawler-mounted crane-excavator, has been announced by Schield Bantam Co., Waverly, Ia. The improvements include: A new 6-cylinder gasoline engine, the Continental F-186, which will be standard equipment on all Bantam basic units.



New Two-Shoe Swing Clutch Design

The engine develops 41.5 hp at 1505 rpm. A new two-shoe swing clutch design, consisting of a rigid two-shoe internal expanding swing clutch with floating shoes to give smoother clutch action. A new steel drive tumble for crawler double hook rollers. Bevel gear mounting, vertical track drive bolt-on crawler frames. Track frame extensions.

In addition new higher carbon and alloy content steel are used for vertical swing shift, bevel gear, vertical track drive, ring bull gear, trunion base roller path and directional clutch shift.

For more information circle 132 on Service Coupon Page 16 and mail now.

Hydraulically Controlled Scarifier

A hydraulically controlled scarifier that operates independently of the loader has been introduced by Wagner Iron Works, 1905 S. 1st St., Milwaukee 1, Wis. The hydraulic control allows the operator to set the scarifier down to a depth of 7 in. and hold it there.

Hydraulically Controlled Scarifier

Designed for use with a loader equipped John Deere 40C tractor, the new attachment rips and loosens packed surfaces, worn and broken down "hard top." This permits the loader to handle loads faster, and at the same time eliminates much of the wear and tear on the bucket or blade.

For more information circle 133 on Service Coupon Page 16 and mail now.

Increasing Life of Traffic Signs

A Reflecto-Kit announced by Prismo Safety Corporation, Huntington, Pa., furnishes the materials and instructions for coating signs with a tough plastic binder into which is sprayed a coat of glittering glass spheres. This is stated to give a brilliant, wide-angle reflective surface that will gleam at all hours, in all-weather and which will protect the sign from weather, stones, scratches and minor vandalism.

Available in three sizes and in white, yellow or 12 assorted colors, the Reflecto-Kit requires no special skills to apply. One application is said to last 5 to 7 years and is completely anti-peeling.

For more information circle 134 on Service Coupon Page 16 and mail now.

Power and Speed Increased in I-H Diesel

Power and speed have been increased in the UD-264 four-cylinder diesel power unit of International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. The unit is now in production at 55 net

horsepower at 1,800 rpm. Previously, operation above 1,600 rpm was available only with engineering approval. At 1,600 rpm, the unit develops 52 HP. Despite the increase in power and speed, there is no change in the price of the UD-264.

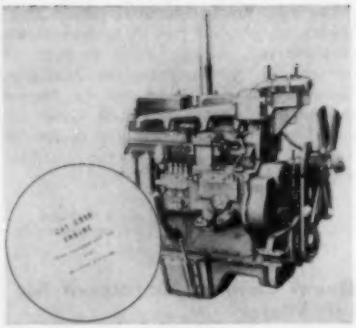
For more information circle 135 on Service Coupon Page 16 and mail now.

125 Hp. 1200 rpm Diesel Engine

A new 125 hp, 1200 rpm, 4-cylinder, 4-cycle, valve-in-head diesel engine, designated as the D339, has been introduced to the line of diesel industrial engines of Caterpillar Tractor Co., Peoria 8, Ill.

This new unit, a 5¾ in. bore and 8 in. stroke engine, replaces the discontinued D8800 in the Caterpillar line. The D339 offers 25 per cent more horsepower and operates at 200 more rpm than the D8800. In addition, it has many engineering advancements which give it better all-around performance, greater compactness, neater appearance and easier-to-service features. It is designed to power a variety of industrial installations easily.

One of the key new features in the D339 is an engine balancer which permits the 4-cylinder engine to operate at 1,200 rpm with the same degree of smoothness as a six-cylinder design. Two off-set weights rotate at twice engine speed and are so timed that they eliminate unbalanced forces inherent in all 4-cylinder engines.



Cat 339 Diesel Engine

The engine is being offered with a choice of three different types of starting systems — air, direct electric and gasoline engine. Electric starting for the gasoline starting engine is also available.

For more information circle 136 on Service Coupon Page 16 and mail now.

Tamper Compacts Backfill In 10 in. Trenches

A new Thor triplex narrow ditch tamper which permits backfill tamping in trenches as narrow as 10 in. and operation at grade level in ditches up to 5 ft. deep because of its adjustable handles, has been announced by Thor Power Tool Co., 175 N. State St., Aurora, Ill. The triplex tamper, mounting three Thor air-powered tampers, is operated by only one man and features close-coupled design to permit tamping in narrow gas line trenches, water line trenches, etc. The handles, which may be adjusted both vertically and horizontally, allow tamping at any level from the surface to a 5 ft. depth with simple, quick adjustments.

Thor Triplex Ditch Tamper

For more information circle 137 on Service Coupon Page 16 and mail now.

For items on manufacturers literature see page 123

for DUAL EXPRESSWAYS and AIRPORTS
...FRINK ROLL-OVER SNO-PLOWS
ROTATES FROM LEFT HAND TO RIGHT HAND PLOWING POSITION IN 15 SECONDS

The Roll-Over is a high speed, high capacity plow designed for use on airports, dual highways or open areas to move snow either to the right or left as wind direction and terrain may require.

This unique plow, made only by Frink, can be hydraulically reversed to deliver snow to either side by rotating the moldboard, thus it has the advantage of being able to discharge to the left and yet travel *with* the flow of traffic.

The Frink Roll-Over Sno-Plow combines all the desirable one-way features of good visibility, high speed, throwing and spreading ability with the versatility of a reversible plow.

By slight modification to the Frink lifting device assembly this plow may be used interchangeably on suitable sized trucks equipped for the Frink V-Type, One-Way Type or Reversible Blade Type Sno-Plows.

FRINK SNO-PLOWS

For further information on this Sno-Plow write for catalog to Clayton, N. Y., Box RS 5511

FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK

Made in Canada by

FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.

. . . for more details circle 203, page 16

Manufacturers' Literature

Trenching Machine

A new attractive 2-color bulletin describing its newly designed Model 155 ladder-type Trenchliner and illustrating its minimum height and width clearance is available from Parsons Co., Newton, Ia., a subsidiary of Koehring Co., Milwaukee, Wis. Compact design, lower center of gravity and low ground bearing pressure are added characteristics of the new Trenchliner. The unit is 7 ft. 4 in. high and 5 ft. 4 in. wide. In work capacity, the 155 Trenchliner is stated to be capable of producing from 5.8 in. to 12.75 lin. ft. of trench per minute in a range of 30 digging speed selections by lever control. With a simple sprocket change, a higher range of speeds is made available to produce a maximum of 25 lin. ft. of trench per minute. Maximum trench depth for the 155 is 8 ft. with widths ranging from 16 through 26 in.

For more information circle 138 on Service Coupon Page 16 and mail now.

Trailer Dumps

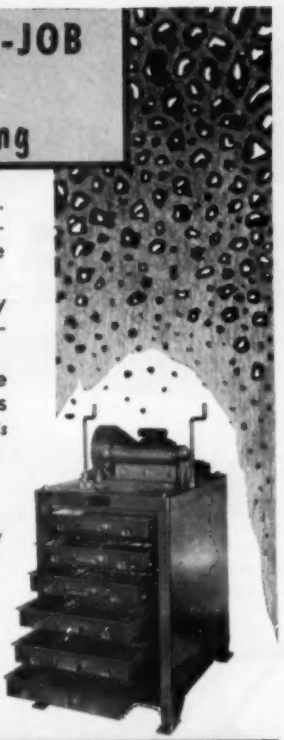
A new 6-page catalog, describing its complete line of transporter, excavator and hitchhike trailer dumps, has been announced by Galion Allsteel Body Co., Galion, O. Printed in 2 colors, the new catalog illustrates Models SSM, SSMF, STM and TTM Transporters, Models TTE and TTEF Excavators and Model HH Hitchhikers. Also furnished are detailed specifications for each model covering body cubic and payload capacities, hoists, chassis details, axle ratings, construction details and other data. Covered in the catalog are Galion's single and tandem axle transporters, with payload capacities of 10 to 36 cu. yds. and 18 to 35 tons, the 4 wheel, full trailer Hitchhiker series handling materials payloads of 10 to 20 cu. yds. and up to 18 tons, plus the payload carried by the towing truck, and for off-the-highway hauling of 10 to 33 cu. yds. loads weighing up to 50 tons, Galion's heavy duty excavator series.

For more information circle 139 on Service Coupon Page 16 and mail now.

Electric Plants

A 4-page folder illustrating and describing representative models in its broad line of electric plants is available from Kohler Co., Kohler, Wis. Intended for use by distributors and dealers as a showroom folder or as a mailing piece, the 8½ x 11 in. publication is printed in two colors plus black. Pointing out that Kohler makes available various types of electric plants for sole supply, continuous, heavy-duty service, automatic stand-by protection or for marine use,

Prevent DELAYS ON-THE-JOB with fast, sure GILSON Screen Testing



Foul-ups in sizing specifications can be costly. You can test every shipment of highway aggregate — quickly and accurately — with the **GILSON** Mechanical Testing Screen.

The **GILSON** Screen pays for itself many times over—and **GILSON** does the job *fast*—five minutes or less per complete test.

GILSON handles up to one cu. ft. of sample — crushed stone, gravel, slag, coal, ores

A Sand Attachment for handling 8-inch sieves is optional equipment.

Here's why you want GILSON

1. Makes tests quickly and accurately
2. Two to seven separations simultaneously
3. Screen trays independently removable
4. Trays balanced to same tare weight
5. Visible separation to refusal
6. Few moving parts.
7. Sturdy construction
8. Size range 4" to 200-mesh

NO MORE GUESSWORK ON SIZING
NO MORE TEDIOUS SCREENING BY HAND

Write for information and prices

GILSON SCREEN COMPANY, Malinta, Ohio

. . . for more details circle 189, page 16

COLD WEATHER

Can't stop Chicago contractor Helmar Hedman and Summeraire

300,000 BTU's PER HR. . . . yet priced 20-30% lower than smaller heaters

Clayton

SUMMERAIRE PORTABLE, OIL FIRED SPACE HEATER

Helmar Hedman, like all contractors, makes money when jobs are finished on time . . . *weather or not.* Summeraire chases winter cold . . . dries out new construction; prevents freezing of concrete while curing; keeps workmen warm. Durable, portable, self contained; electric or gasoline engine drive, Summeraire delivers 2400 cu. ft. high velocity heated air per minute at amazing economy. 300,000 BTU capacity at a price 20-30% lower than that of smaller heaters.

for Fast, Low Cost **HEATING DRYING THAWING**

CLAYTON MANUFACTURING CO., Box 550 El Monte, California RS-11
Without obligation, send complete details, prices and name of nearest Summeraire dealer.

NAME_____

ADDRESS_____

CITY_____ STATE_____

. . . for more details circle 209, page 16

400% MORE PUMPING!

and LESS SHOCK

LESS WEAR

LESS STRAIN

ENGINE DRIVEN
DIAPHRAGM PUMP
Model 3D-8 R 6

MOTOR DRIVEN
DIAPHRAGM PUMP
Model 3D-E 1½

THE BEST DIAPHRAGM PUMP *Ever Built!*

GORMAN-RUPP Firsts —— among all other diaphragm pumps of like size and type.

- Diaphragm drive rod spring-cushioned on down stroke. Runs smoothly. Increases diaphragm life **10 Times.**
- More Pumping — by as much as 400% at 25 feet static lift.
- Suction Accumulator provides continuous smooth flow of water.
- One man handling — engine driven pump only 130 pounds job-to-job. Motor driven 165 pounds.
- Easy hook-and-tighten fittings with hose connected.

See this pump at work on the job, through your Gorman-Rupp distributor. It is absolutely guaranteed to outperform and outlast any 3 in. single diaphragm pump comparably powered now on the market.

Ask for information bulletin 4-DR-11

NOTES FROM THE FIELD - -

Bridging Kokosing River on U. S. Route 36 at Mount Vernon, O. Model 3D-E1½ diaphragm pump and model 3362-B contractors' pump, both electric powered, and model 3205 contractors' pump engine powered -- On The Job.

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

. . . for more details circle 212, page 16

the folder gives details about a number of leading models. A chart detailing dimensions, weight and other technical data on various models is shown as is a listing of nationwide Kohler branch sales offices were electric plant information is available.

For more information circle 140 on Service Coupon Page 16 and mail now.

Tracks for Tractors

The story of tracks is told in "How to Be Sure About Track Parts," a new booklet (Form DE586) published by Caterpillar Tractor Co., Peoria 8, Ill. This 8-page booklet tells of the research and care behind the rugged, yet lightweight tracks on every Caterpillar-built tractor. Starting with a chemical analysis of every mill heat of steel, the path of inspection and testing behind every track part is traced.

For more information circle 141 on Service Coupon Page 16 and mail now.

Concrete Compression Tester Conversion Chart

An 8½ in. x 11½ in. conversion chart on heavy varnished card stock, available free of charge from Forney's Incorporated, P. O. Box 310, New Castle, Pa., gives instant conversion from tons to p.s.i. for all standard test cylinders, and all standard full size and modular concrete blocks. It eliminates the need for paper work when making compression tests.

For more information circle 142 on Service Coupon Page 16 and mail now.

Cellular Concrete

A new information brochure on the Mearlcrete system for making cellular concete is available from Mearl Manufacturing Corporation, 153 Waverly Place, New York 14, N. Y. In addition to telling what the Mearlcrete system is and how it works, the brochure illustrates with charts and photographs the advantages of cellular concrete made by the Mearlcrete system. Typical installations using Mearlcrete foam concrete are also shown.

For more information circle 143 on Service Coupon Page 16 and mail now.

Truck Cranes and Cruiser Cranes

Catalog 700-G-27 of American Hoist and Derrick Co., 63 S. Robert St., St. Paul, Minn., describes and pictures their 30-ton truck and cruiser cranes. The units are shown on various types of jobs; and the many separate details give an unusually clear idea of interior arrangement and make-up.

For more information circle 144 on Service Coupon Page 16 and mail now.

(For more items see page 140)

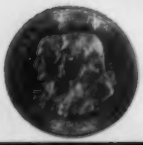
Bituminous ROADS AND STREETS

Published by Gillette Publishing Company
23 West Monroe Street, Chicago 10, Illinois

Paving Plant Inspectors or Paving Materials Engineers?

Rubberized Asphalt — Wyoming Experiment

NOVEMBER 1955

St. Louis makes saving  *on paving*

H. C. Halley, Standard Oil Asphalt Engineer (left), and C. G. Gilmore, St. Louis Acting Street Commissioner, observe 10-ton Buffalo-Springfield roller rolling final coat of STANDARD Asphalt Mix. H. C. Halley is an old hand at asphalt engineering. He has been providing technical service on asphalt application for nearly 30 years.

STANDARD

STANDARD OIL COMPANY
(Indiana)

Resurfaces street with STANDARD *Asphalt – saves more than $5.50 per square yard over cost of repaving*

IN SOUTH ST. LOUIS, the City Department of Streets and Sewers used STANDARD Asphalt to resurface a brick-paved thoroughfare.

In resurfacing this street, an initial leveling course of STANDARD Asphalt was laid down. This performed three important functions: (1) eliminated irregularities in the surface, (2) provided an even base for the finish coat, (3) provided a uniform thickness of the finish coat. Over this a three inch STANDARD Asphalt mix was applied.

St. Louis Department of Streets and Sewers availed itself of several important advantages when ordering STANDARD Asphalt:

Frank Kriz, St. Louis Director of Streets and Sewers, H. C. Halley and C. G. Gilmore (L. to R.) inspect leveling coat of asphalt mix, part of Compton Avenue resurfacing project.

1. It got a handy source of supply. There are five Midwest shipping points for STANDARD Asphalt, one of them only a few miles from St. Louis.
2. Tank car or tank truck deliveries were made from supplier directly to St. Louis paving plant.
3. Ordered from a supplier whose men know road building, are able to anticipate needs, anticipate problems before they occur.
4. Ordered asphalt from a supplier with a demonstrated record of delivering on contracts regardless of current abundance or short supply of road building materials.

You can get these advantages when you buy asphalt from Standard. Find out. In the Midwest, call your nearby Standard Oil office. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

. . . for more details circle 261, page 16

the Versatile MADSEN 481

...today
a 4000-lb. plant
.
.
.
...tomorrow
a 6000-lb. plant

the Asphalt Plant that "GROWS" with your requirements

RECENT MONTHS have seen highway construction at a high pitch . . . and it is safe to say that the immediate years ahead will see increased activity in this field. Across the country, many contractors are getting their share of this highway business with the help of the outstanding MADSEN Model 481 Asphalt Plant.

We could devote pages talking about the years-ahead engineering features of this outstanding plant. Features that speed the charge-mix-discharge cycle . . . reduce maintenance costs . . . increase plant accessibility . . . features that make the operator's job easier . . . and features that make production above rated capacity, the rule rather than the exception.

But right now, let's talk about the versatility of the MADSEN Model 481. To begin with, this asphalt plant is designed as a 6000-lb. batch plant. It is big — oversize throughout — basically designed to handle up to 180 T.P.H. (on a one-minute mixing cycle) and it is consistently topping this. Now, if a 4000-lb. plant will handle your requirements today — purchase the Model 481 as a 4000-lb. plant, holding your today's investment to a minimum. Then, as the years go by, and your requirements grow, you may convert your plant to a 5000-lb. or 6000-lb. plant with only minor modification costs. This is real economy. You have only one major investment, and you are in a position to get your share of today's highway work and you are also set up for a profitable operation for the years ahead.

Yes, you can grow with the MADSEN 481 . . . as the MADSEN 481 "grows" with you.

MADSEN Equipment that Serves®

THE MADSEN MODEL 481 ASPHALT PLANT has more than 25 big features that you will want to know about. Your MADSEN Distributor has the complete story. Ask him for a copy of Bulletin No. 800 . . . and for the location of a MADSEN 481 in your area. Pay a visit to this outstanding plant and learn the MADSEN story first hand.

MADSEN WORKS
CONSTRUCTION EQUIPMENT DIVISION
Baldwin-Lima-Hamilton Corporation
14120 EAST ROSECRANS AVENUE • P.O. BOX 38 • LA MIRADA, CALIF., U.S.A.

BLH
CONSTRUCTION EQUIPMENT DIVISION

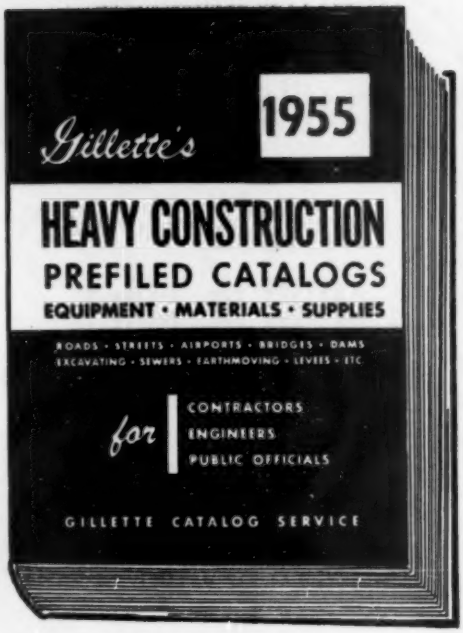
. . . for more details circle 244, page 16

here . . . without a doubt . . . is the most useful buying catalog in your office

. . . and here are some reasons why you should be USING IT DAILY!

- Catalogs are PREFILED — saving you time and space required to file individual manufacturers' catalogs.
- Saves you the time and inconvenience of writing to manufacturers for catalogs.
- Gives you all the facts needed BEFORE you make a buying decision.
- Manufacturers' names and trade names indexed alphabetically for quick reference to individual catalogs.
- All the buying information is 'boiled down' — designed for your convenience.

After checking the advantages listed above, you can see why this ONE CATALOG offers you so MANY advantages . . . saving you both time and money, not only in the mechanical and physical aspects of a cataloging operation . . . BUT MOST IMPORTANT OF ALL . . . it is available WHEN you NEED it . . . BEFORE you make your buying decisions! The manufacturers represented in this catalog are literally 'meeting' with you in your office — offering you all the information you could possibly need concerning their products. Why not meet them at least half way — and USE THEIR PREFILED INFORMATION!



Here are the manufacturers represented in Gillette's Heavy Construction Prefiled Catalog:

Aeroil Products Company
American Steel & Wire Div.
Anthony Company
Armco Drainage & Metal Products, Inc.
Austin-Western Company
Badger Machine Company
Barber-Greene Company
Bicknell Manufacturing Co.
Blaw-Knox Company
Briscoe & Son, E. B.
Bros Boiler & Mfg. Co., Wm.
Buffalo-Springfield Roller Co.
Butler Bin Company
Carey Manufacturing Co., Philip
Chrysler Industrial & Marine Engine Corp.
Clark Equipment Company
Cleveland Trencher Company
Colorado Fuel & Iron Corp.
Concrete Surfacing Machine Co.
Continental Motors Corporation
Cummer & Son Co., F. D.
Cummins Engine Co., Inc.
Detroit Diesel Engine Div.
Dorsey Trailers
Electric Tamper & Equipment Co.
Erie Strayer Company
Flexible Road Joint Company
Flintkote Co.
Galion Iron Works & Mfg. Co.
Gar-Bro Manufacturing Co.
Gar Wood Industries, Inc.
General Motors Corp.
Gledhill Road Machinery Co.
Goodall Rubber Company
H & L Tooth Company
Harnischfeger Corporation
Heil Company
Heltzel Steel Form & Iron Co.
Henry Manufacturing Co., Inc.
Hogan Company
Hough Company, F. G.
Huber Manufacturing Co.
Ingersoll-Rand
Jackson Vibrators, Inc.
Joy Manufacturing Company
Keystone Asphalt Products Company
Kiesler Company, Jos. F.
La Crosse Trailer Corporation
Le Roi Company
Littleford Bros., Inc.
McKiernan-Terry Corporation
Mid-Western Industries, Inc.
Minneapolis-Moline Company
Naugatuck Chemical Div.
Owen Bucket Company
Pacific Car & Foundry Co.
Pioneer Engineering Works, Inc.
Reliance Steel Products, Inc.
Republic Steel Corporation
Rogers Brothers Corp.
St. Paul Hydraulic Hoist
Seaman Motors, Inc.
Servicised Products Corp.
Shawnee Mfg. Co., Inc.
Shunk Manufacturing Co.
Stow Manufacturing Co.
Symonds Clamp & Manufacturing Co.
Timken Roller Bearing Co.
Toncan Culvert Association
United States Rubber Company
United States Steel Corp.
United Steel Fabricators, Inc.
Wellman Engineering Company
Wico Electric Company
Wisconsin Motor Corporation

LOAD

Model 543 pneumatic tired Bucket Loader. Easily converted for coal or snow.

Model 82-A crawler mounted Bucket Loader. Hydraulically controlled trimmer-conveyor optional.

LOAD the cheapest way.

LOAD from stock pile, bank, or windrow.

LOAD and screen in one operation.

LOAD and strip topsoil in one operation.

LOAD with the most advanced engineering developments in the loading field.

Let us show you how a Barber-Greene Loader can reduce your costs.

54-34-BL

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cost studies . . . nearby job inspection . . . plant layouts

Barber-Greene

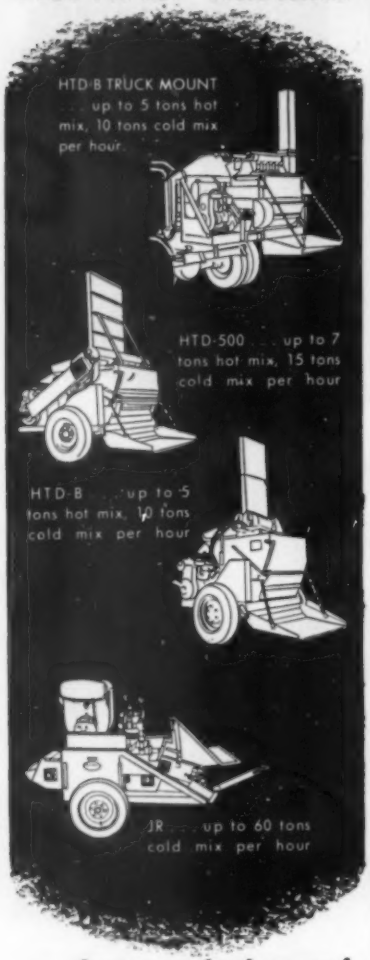
AURORA, ILLINOIS, U.S.A.

BG

CONVEYORS LOADERS DITCHERS ASPHALT PAVING EQUIPMENT

. . . for more details circle 181, page 16

McConnaughay
ASPHALT MIXERS


HTD-B TRUCK MOUNT
. . . up to 5 tons hot mix, 10 tons cold mix per hour.
HTD-500 . . . up to 7 tons hot mix, 15 tons cold mix per hour
HTD-B . . . up to 5 tons hot mix, 10 tons cold mix per hour
JR . . . up to 60 tons cold mix per hour

. . . for resurfacing and patching in any season

Designed for economy of operation and fast production, the McConnaughay line of Asphalt Mixers meets every need for most resurfacing as well as all types of pavement patching. Working on location, McConnaughay HTD Mixers provide the *exact amounts* of materials needed and effectively remove both moisture and solvents from bituminous mixtures... positive assurance that patches and resurfaced areas will set up hard. For details and specifications on the mixers above and on the JR and HTD-LP models (not illustrated), write, wire or 'phone...

ASPHALT EQUIPMENT CO., INC.
3929 Buell Drive, Fort Wayne, Indiana
National distributors for
K. E. McConnaughay, Lafayette, Ind.

. . . for more details circle 243, page 16

Paving Plant Inspectors

or

Paving Materials Engineers?

By Merle L. Nelson
Highway Engineering Associate
Materials and Research Department
California Division of Highways, Sacramento

Quality control in asphalt pavement construction requires that the plant inspector look beyond the mechanical plant production routine. Analysis of test results is the key, this author points out.

MODERN day asphalt paving plants with their push button controls, electric eyes, signaling bells and many other automatic features have pretty well eliminated many of the earlier day plant problems of the inspector, and on the other hand have presented him with the problem of dealing with a tremendous increase in daily tonnage production. Established commercial plants in or near metropolitan areas usually work from stockpiles neatly piled on concrete aprons with bulkheads separating the piles. These stockpiles may number eight or 10 or more and each pile consists of a given sized aggregate. Some Eastern plants have covered and heated aggregate bins, so that materials will flow in cold weather. With facilities such as this, once the gate openings feeding the cold belt are established, little trouble in controlling the mix is experienced.

These are not the conditions which most of us have in mind when we discuss the complex problems of plant control. Rather, I think, we have in mind the job-site plant which the contractor has hauled in and erected to produce a paving mixture from a local materials source as it was deposited by Mother Nature. These are the conditions which require the utmost in knowledge of materials and full cooperation between inspector and producer, if a satisfactory paving mixture is to be obtained.

It is my contention that the majority of the present day asphalt plants, including the portable roadside setups, are equipped to do a good job of mixing; generally we can expect to get out about what we put into them provided they are equipped with standard control facilities. Therefore, it would appear that the inspector should direct his efforts in the direction of materials engineering and he should be, above all else, trained to analyze tests results.

Generalizations are no more warranted in discussing plant inspectors than for any other category of professional or sub-professional engineers. Plant inspectors are or should be engineers. Naturally they represent a considerable variety in personality, temperament, education, training and experience. Nevertheless, there is a rather natural tendency for all individuals to absorb something in the way of a standardized attitude depending upon the title or job classification under which they work. Just as design engineers, maintenance engineers and construction engineers have recognizably characteristic viewpoints and attitudes, so likewise a large number of plant inspectors are inclined to focus attention upon the plant; whereas the agency hiring the inspector is paying for the materials produced by the plant and these should be the primary consideration.

Many plant inspectors can tell you about the most intricate workings of the mechanical aspects of the plant. They may have some very excellent ideas on how the manufacturer can

improve its efficiency. They are good "plant men" but it does not necessarily follow that they can study the reports of preliminary tests covering the aggregate sources and analyze them thoroughly. It is also true that many agencies or jurisdictions do not furnish the plant inspector with very much in the way of test data, but I wish to emphasize the point that the energies and efforts of the inspector at a paving plant would be better directed if he thought of himself as a materials inspector and made full use of all test data or evidence of any sort which would tell him whether or not the paving mixture being produced meets all the essential requirements for aggregate gradation, asphalt content, et cetera. The point which must be emphasized here is that while it is possible to keep a plant running quite well simply by close watching or "inspection," there are no engineers who can tell whether an asphalt paving mix is "right" simply by inspection, although many individuals labor under the delusion that they can do this.

- Job-site plants and use of local materials require utmost knowledge of materials engineering.
- Test results need continual analysis to determine what to put into a plant. Mixing routine usually a secondary problem.
- A policy of furnishing adequate test data to the inspector, and of training inspectors in test analysis, is an important management function of the highway department.
- Four control tests are considered the inspector's "best friends." Wash sieve analysis is particularly important determining kind of paving mixture obtained.

Just Another Inspector

All of this simply brings out the fact that unless the inspector is trained first to analyze test results and become insofar as possible a materials man, the best that can be expected is that he will become just another plant inspector. Many plant inspectors are aware of the need for additional knowledge and training in this field. Supervisors in charge of this work should fully realize this condition and make every effort, through training programs, to direct this training into the field of Materials Engineering.

It is not the intent to imply that the inspector need not be concerned over the fundamental working sequence of the plant. However, this can be learned in a few hours and there is no good purpose served by the inspector assuming the worries and duties of the plant superintendent. There are a few features of every plant which need to be checked by the inspector to determine compliance with specification requirements. Ordinarily this inspection need take very little of the inspector's time.

It is my opinion that the foremost and primary consideration of the so-called plant inspector should be the evaluation of the materials which are to be used, and a revaluation of the completed pavement mixture as it is produced. These evaluations should be based on physical tests.

In California we favor standardization of control facilities throughout the state as far as is humanly possible. The first step in effecting and enforcing such standardization is the use of a check list and report form called the plant "audit" sheet which lists the control facilities which we consider necessary for both the plant and the engineer at the plant, (Fig. 1).

A traveling engineer either from Headquarters Construction or Materials and Research Department, or one selected by the district in which the work is to be performed, visits the plant in question and after a close inspection of the facilities, fills out the plant audit form. A copy of the "audit" is given to the Construction Engineer in charge of the area or district and he is required to take immediate steps to rectify any substandard facilities that may be indicated by the report.

With standardized control facilities provided, knowledge of materials and tests becomes the prime requisite if we are to operate on a sound and dependable basis for control.

The Materials and Research Department of the California Division of Highways advocates the use of four control tests which we think are the inspector's best friends and should be so considered by him.

These control tests consist of:

1. The Sand Equivalent Test, (Test Method Calif. 217-A).
2. The Centrifuge Kerosene Equivalent Test, (Test Method Calif. 303-A).
3. Wash Sieve Analysis, (Test Method Calif. 202-B).
4. The Asphalt Extraction Test, (Number unassigned at present).

The Sand Equivalent Test is a rapid and relatively simple method for detecting changes in the amount of adverse fines or clay in the materials in the deposit. If performed frequently it will keep the inspector well informed as to the uniformity of his source.

The Centrifuge Kerosene Equivalent Test requires only a matter of minutes to perform and provides the inspector with a reliable method for predetermining the proper amount of asphalt for his particular mixture.

Wash Analysis Vital

The Wash Sieve Analysis is made mechanically using a Tyler sieve shaker as an agitator. This apparently simple test is probably one of the most important of the control tests, as the uniformity of the asphalt content, density, texture and stability of the completed mixture is dependent on maintaining a uniform grading of the aggregates.

There may be cases where a deposit is sufficiently uniform so that, after performing enough of both wash and dry sieve analyses, a conversion factor can be used to convert dry analysis to wash analysis for the sake of expediency.

The inspector must realize however that the relationship between the wet and dry sieve analysis can vary widely and that the wash analyses may show an increase from 20% to 500% over the amount indicated by dry sieving.

The inspector must know his materials source, and to know it with any degree of dependability he must realize the need for an engineering approach. Which, of course, means the utilization of factual data.

The Extraction Test provides the very important answer to what kind of a paving mixture is coming from the plant. The asphalt and moisture in the mixture are extracted in one operation and a sieve analysis is performed on the extracted aggregates.

Results of tests obtained by methods such as these and used in conjunction with more complete preliminary tests will provide the inspector with a sound scientific means of control provided that he is trained to

(Continued on page 145)

● Work in progress on comparative test section.

Rubberized Asphalt — Wyoming Experiment

By F. B. Odasz and R. V. Witter
Husky Oil Co., Cody, Wyoming

Rubberized and non-rubberized asphalt were used in a comparative sealcoat test installation, using complete molecular dispersion of rubber materials

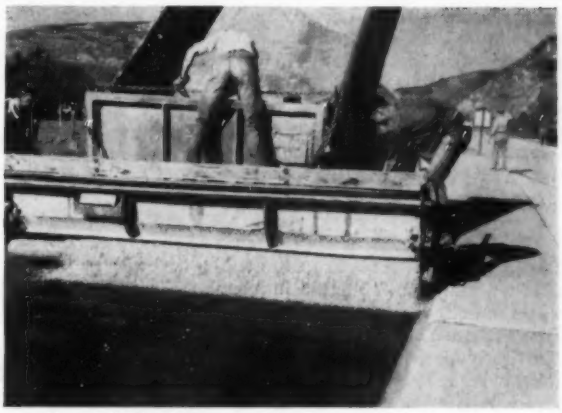
THE relative merits of rubberized asphalts is one of the most controversial subjects in current asphalt technology. Ever since 1929 when the first rubberized asphalt pavement was laid, its proponents have emphasized such attributes as lower maintenance cost, greater durability, better chip retention, less noise, superior skid resistance, and even better bounce. Skeptics merely looked at the economics, questioned the advantages, and decried the project as a waste of money.

Rubber has been incorporated into asphalt pavements by various means. Powders, pellets, reclaimed rubber, and other rubber-carrying additives have been added either in hot-mix or in cold-mix operations. Attempts to sealcoat the surface have been only slightly successful and very expensive because many rubber additives do not readily lend themselves to sealcoating operations.

However, in 1954, our attention was drawn to the Benson Process of incorporating rubber into asphalt; it offered a new concept of developing rubberized asphalt products which were free from the contamination of fillers and incompatible rubbers. In its preliminary stages this process presented several practical problems which had to be overcome before production on a plant scale could be successful. By coordinating laboratory and pilot plant data effectively, the bugs were ironed out of the process in a relatively short time. The results, immediately relayed to the Engineering Department, enabled them to design, construct, and have the plant in operation so that the first carload of rubberized asphalt was delivered to a customer within two months of the start of the development work.

By contrast with former attempts to rubberize asphalt, which were based primarily on a mechanical mixture of rubber solids in asphalt, the Benson Process as developed at Husky provides such an intimate microscopic dispersion of the rubber in asphalt that some very striking effects have been observed which are illustrated

● Standard rolling and other equipment was used on the project, the only variant from standard methods being the use of the special rubberized materials.



● Applying asphalt and chip cover — again, standard equipment used.

by the accompanying pictures.

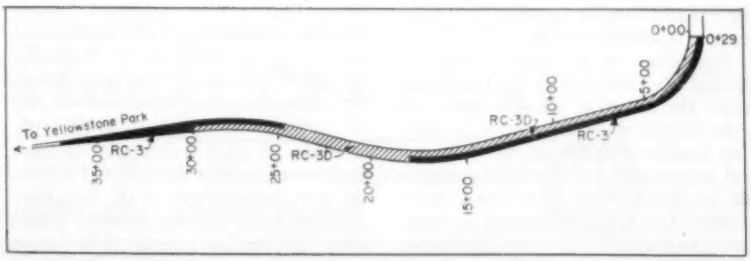
Because some contractors have had the unhappy experience of having their distributor bars and nozzles clog up with sediment or rubber coagulum, it was considered particularly desirable to develop a product which would protect the contractor and highway departments from this expensive nuisance. Microscopic dispersion does just this!

During the past year, the Wyoming State Highway Department laboratory has evaluated samples of rubberized asphalts for both sealcoats and paving use. Impressed with the unusual qualities of the RC-3D, the highway department set up a controlled experiment in cooperation with the Husky Oil Company. This job was to be the first rubberized sealcoat in the State of Wyoming.

The location of the experimental plot is a newly paved section west of the City of Cody on the busy Cody-Yellowstone Park Highway, US 14 and 20. This is shown in Figure 1 during construction of the rubberized sealcoat project which consisted of both rubberized or unrubberized cutback asphalts and ⅝ in. stone chips. On the average day in tourist season 2,000 cars pass over this road. For the experiment, 21,830 sq. yd. of the divided lane highway was sub-divided into the sections which were treated as shown in Figure 2. By this plan each side of the road contained both rubberized and unrubberized sealcoats to equalize the effect of the direction of the traffic. Furthermore, other influences which affect the life of the pavement are also equalized. These are intensity of sunlight, affect of wind, speed of traffic on curves, acceleration and deceleration of traffic, irregularities in the base, and variations in weather during the sealing operation.

Sealing began on August 26, 1955, by the Taggart Construction Company of Cody, Wyoming, under the direct supervision of Project Engineer William F. Loeper of the Wyoming State Highway Department and his assistants. The pavement was pre-swept with a rotary broom in the usual manner. The 1,000-gal. Rosco distributor shown in Figure 3 sprayed the asphalt at the usual 150-200°F in 9-ft.

(Continued on page 142)



● Diagramatic sketch showing location of the rubberized and non-rubberized asphalt.

VIEWS AND COMMENTS

By H. G. Nevitt

Progress With Rubber

The use of rubber in asphalt pavements is today attracting much attention. The idea that rubber as an additive might improve asphalt is far from new, and there has been much good work already done in this field; however, we are now getting a little better idea on just what can be accomplished and what will be required to make the use of rubber practicable. Likewise the program has gained support from substantial commercial interests and, as we have pointed out, there is nothing which tends to bring about progress more rapidly than this.

We therefore assume our readers have given some thought to the subject and may find interest in comments based on information gained from those conversant with the field. Our discussion will bear on the fundamental requirements for its proper development.

As brought out in our item "The Age of Additives," the widespread use of rubber or any other additive cannot be justified except on an experimental basis until it has been clearly demonstrated that there are real economic benefits therefrom. Incidentally, we do not believe this will be necessarily easy in the case of rubber, despite the marked enhancement of certain structural characteristics by a small quantity of rubber. We continue to maintain that it will be hard to build better surfaces from the standpoint of use than our best asphalt pavements today — the construction which reflects our full skill in the use of asphalt. Additives should not be used to avoid the need for engineering knowledge or judgment. Rubber must justify itself through making possible the construction of equally good surfaces at a lower final cost.

Regardless of this final outcome, the industry certainly needs to understand the situation about rubber, in order to give those attempting to provide benefits through its use the help and encouragement that will be essential to determining this economic answer. And if the economics do turn out to be favorable, the steps discussed will be even more necessary to properly develop the use of rubber and obtain the maximum good from it.

As is so often the case, our principal need in this matter of using rubber is a determination of the facts. This implies the placement of its use on a true engineering basis, with the technical data presented meeting engineering requirements. First of all certain basic questions need answering.

Some Answers Needed

Exactly what will rubber do? This implies a development of test methods and data that will clearly demonstrate the effects of the additive on the properties which are essential to road structure improvement. This last statement has important implications. The mere fact that rubber changes the properties of asphalt, and does so in an apparently favorable fashion, has no meaning unless it is shown that these changes are reflected in benefits which have structural or similarly needed significance.

A second question is, what kind of rubber should be used? The possibilities in this respect are tremendous; only a rubber expert can even suggest them. We need a systematic survey of the existing knowledge on the effects of different kinds of rubbers. By cataloguing and analyzing these it should be possible to determine which rubbers offer the most promise.

A third question is, how much rubber should be used? This comes back to the basic question propounded above, which is, just how does rubber improve the final resistance of the road structure? When this is understood and measured through tests, some idea of the optimum rubber content, considering both benefits and costs, can be arrived at. Naturally the particular usage, the type of rubber and the asphalt type involved are all variables that must be considered.

When we have a clear idea of these facts — essentially the effect of rubber on the immediate and long-time characteristics of the finished pavement structure as a result of the properties of the asphalt-rubber mixture — we will have to develop adequate means of control for the addition of rubber as well as the construction of the pavement. In this the method of use, the effect for which the rubber is being used, and other factors will be pertinent. Practically, benefits from any material are meaningless unless steps are taken to assure that these benefits are actually obtained in the finished structure.

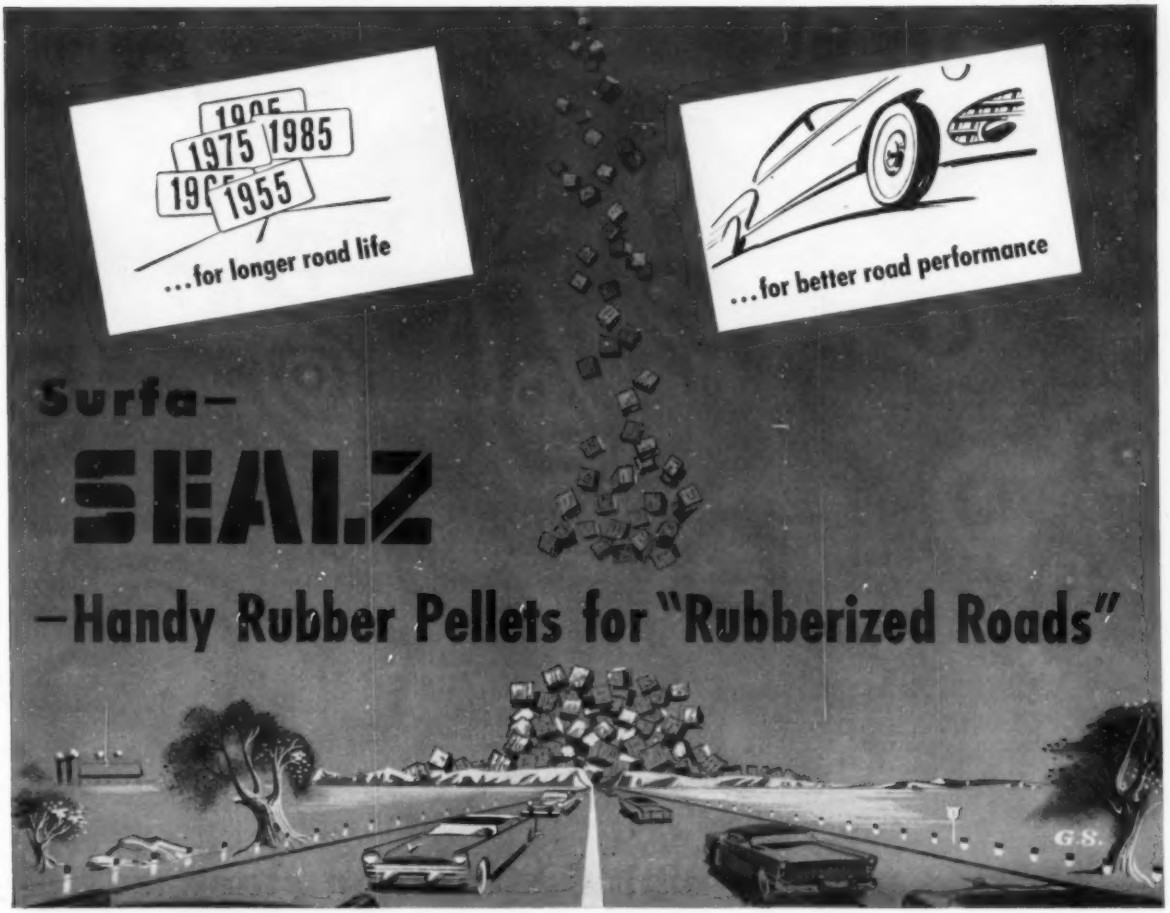
With the engineering facts determined, economics will have to be given a great deal of attention. Obviously, the benefits from the use of rubber must be commensurate with the additional cost per ton of pavement mixtures that it implies. If assurance does appear that this criterion can be met, we must then have cost controls to see that this is the actual result. Pertinent to this phase of the development will be consideration of the possibilities in the way of lower cost rubber, and estimation of how much the present rubberizing costs — inevitably high in this development stage — can be reduced after utilization of rubber has become both routine and fairly widespread.

Cooperative Work Required

It is evident that to answer many of the questions posed in the above, and likewise those which will appear as further information is obtained, a considerable amount of research and investigation over an appreciable period of time will be required. Undoubtedly this cannot be done entirely by the promoters of rubber. The proportion of the cost of a finished road structure containing rubber which will be received by the rubber supplier is far too small to expect him to carry the full burden of developing this information.

In the final analysis the cost of appraising the possibilities of rubber will have to be in some fashion or other allocated in proportion to the possible benefits from its use. This implies the involvement of a number of agencies; for best results they will have to work together closely, de-

(Continued on page 138)



Without special equipment, Surfa-SEALZ Pellets make it easy to use rubber in *any* hot mix plant—make rubber pavement available for *every* job. Surfa-SEALZ Pellets (concentrated synthetic rubber in a dry form) are easily handled. Tossed into a mixing mill, they disperse rapidly, spreading rubber evenly through the mix, and once blended, they do not separate.

Surfa-SEALZ *lengthens road life* by...

MINIMIZING RUTTING! Surfa-SEALZ increases the viscosity of asphalt greatly reducing the tendency to flow under pressure.

REDUCING BRITTLENESS! Surfa-SEALZ's rubbery, highly resilient nature reduces asphalt's tendency to become brittle at low temperatures.

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INCREASING SKID RESISTANCE! The bleeding of asphalt to the surface is one of the greatest causes of slippery highways. Surfa-SEALZ counteracts this tendency of asphalt to bleed.

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STRENGTHENING ADHESION! With its tenacious, flexible bond, Surfa-SEALZ strengthens the bond of asphalt to aggregate.

Rubber-bituminous concrete made with Surfa-SEALZ Pellets needs no special equipment to mix or lay. And Surfa-SEALZ® adds only about $2.00 to the cost of a ton of mix!

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. . . for more details circle 248, page 16

One-man-operated Etnyre "Black-Topper" applying special bituminous material.

Etnyres provide high distribution standards for Knight Paving Products, Inc.

High-type pavements at low cost are now being built by Knight Paving Products, Inc., Rochester, N. Y., one of the largest bituminous materials suppliers in New York State. Distribution of Asphaltar, using low-cost local aggregates, is made with Etnyre "Black-Toppers" to maintain the very highest distribution standards.

Says Mr. Victor H. Pillen, General Superintendent: "Most of our work is done for states, counties, cities, towns, or villages. The very highest distribution standards must be constantly maintained, and this is the main reason we have always used Etnyres exclusively. Our daily operations require the distribution of all standard types and grades of bituminous materials in addition to several customized types and grades, yet we have never had to adjust pump clearances, change spray nozzles, or make any other time-consuming change on our Etnyres in spite of this diversity of products."

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BITUMINOUS DISTRIBUTORS

. . . for more details circle 198, page 16

When the chips are down—

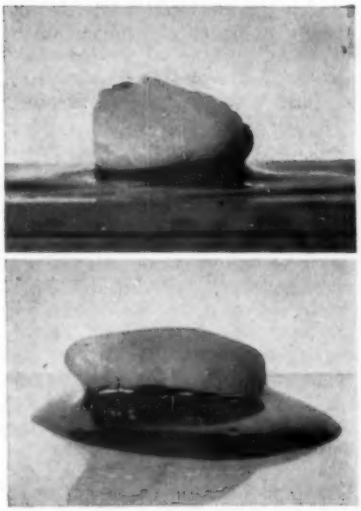
your best bet is BITUMULS®

ON SURFACE TREATMENT and light Armorcoat construction, you can be sure that cover chips are *down to stay* when they go down in Bitumuls. Bitumuls emulsified asphalt literally "climbs" high up on the individual chips, coating them with thin, strong films of pure asphalt. This means maximum cover retention.

In addition, Bitumuls provides an effective seal for the pavement, whether old or new, and assures a safe, non-skid wearing surface.

This superior performance plus the speed, ease and economy of using asphalt in emulsified form, makes Bitumuls the first choice of road-builders everywhere for surface treatment work.

Complete data and specifications on Bitumuls Surface Treatments and Armorcoats are available from our nearest office.



These laboratory photographs show the superior ability of Bitumuls to "wick-up" on the sides of cover chips. Top is a stone put down in an asphalt cut-back; lower, stone put down in Bitumuls.

AMERICAN Bitumuls & Asphalt COMPANY

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Views and Comments

(Continued from page 134)

termining the basic facts and the full scope of the benefits possible from rubber.

The technical phase of this development has many interesting aspects. We need to better understand the basic reactions taking place between rubbers and asphalts. We need to determine just how the improvements it makes in the binder can be taken advantage of to give us a better road structure. An interesting side issue of this latter is the light it will throw on present day bituminous design methods. Are these such as to make possible the prediction of the economic benefits from a rubberized asphalt, when given the improvements in binder characteristic resulting from the addition of rubber? If they cannot, it will add to the realization that we need marked advancement in this area of our technology.

How well can the questions propounded above be answered, and the information indicated as needed be supplied from our present store of general knowledge or the promotional literature available? We fear not too much — a statement which is in no way a criticism of workers in this field, since the requirements are so obviously substantial. In fact, neither criticism of the paucity of really pertinent information, nor complaints that to obtain it is expecting too much, will improve the situation. What is needed is a determined effort to get rubber promotion and rubber use by interested agencies on the most businesslike and sound engineering basis possible, with every effort directed to get all the information required to justify its use on a large scale.

It is clear that rubber in asphalt exemplifies the familiar point that it is often easier to ask questions than to answer them. Yet we certainly will not have real progress with this material unless the facts are developed. As businessmen, the promoters will find that any effort to get the material generally adopted without real engineering information which is pertinent to the use will in the end fail to be profitable. At the same time, we must have enough trial sections of rubber built to bring out the facts. This implies that the handling of such projects must have this need in mind. The mere construction of some miles of satisfactory pavement, but one which perhaps shows a higher cost and does not supply information with which to justify it, will not lead to progress.

The possibilities of rubber are indeed great, but their determination is obviously a considerable job, requiring teamwork by all the interested parties in the industry. We suspect that progress in this cooperative approach will be measured by the clear and realistic thinking, along with adherence to known facts, displayed by all concerned with it.

● Keith M. Saville has been named field engineer for the Calcium Chloride Institute, according to G. H. Kimber, president. Mr. Saville formerly served as materials engineer for the District of Columbia, Department of Highways. Before joining the Department he served with the U. S. Army, Corps of Engineers, as instructor at Ft. Belvoir, Va.

For young engineers

Opportunities in the Bureau of Public Roads for Young Engineers — this is the subject of a new 16-page publication just issued by the Bureau. Available through the Personnel and Training Office Bureau of Public Roads, Washington 25, D. C., the booklet describes the organization, operations, training program and job advantages which make employment in the Bureau attractive to young graduate civil engineers. Copy free on request.

20% MORE ROADS

. . . without increasing the budget

Pinellas County, Florida, had a difficult road building and maintenance problem. Fast-increasing population and tourist traffic created an ever-increasing demand for new roads, repairs and rebuilding. At the same time, increased freight rates on aggregates threatened to cut the road building budget in half.

Pinellas County attacked this problem by using locally available aggregate—with a MOTO-PAVER. This combination has enabled the county to build *20% more roads without increasing their budget.*

Moto-Paver does an excellnt job of mixing with any aggregate, whether it be sand, gravel, stone, slag, crushed shells or other "home-made" material—and most types of emulsions, cut-backs, road oils, tars or other bituminous materials.

In all sections of the U. S., and in many parts of Canada, Europe, South America and the Near East, Moto-Paver has demonstrated its ability to speed the job and cut the cost.

See your local H&B distributor or write for Bulletin MP-55.

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. . . for more details circle 215, page 16

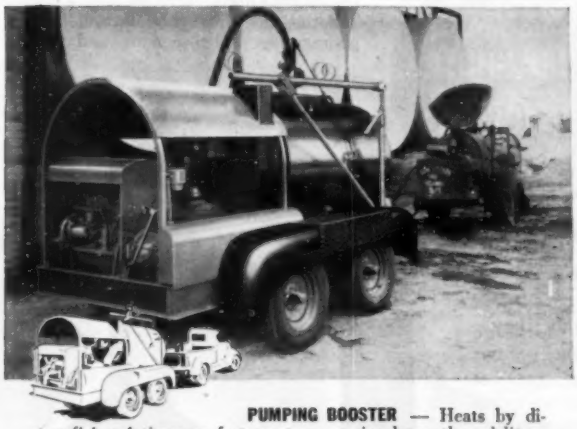
"You get FAST ACTION — to the job...on the job"

... with Cleaver-Brooks oil and bitumen heating equipment!

These self-contained mobile units can be ready to pump, heat and circulate bituminous materials in 20 minutes or less after arrival

If your job can be reached on wheels, any one of these famous Cleaver-Brooks mobile heating units can save you plenty of time and money. Each can be transported as easily as you drive your car . . . put into operation with minor connections — by only one man! Their proven high efficiency, man hours saved, plus elimination of field problems can be important factors in your profit picture. That's why you'll want to know more about famous Cleaver-Brooks Tank-Car Heaters . . . Pumping Boosters . . . and "Deuce" combination tank-car heater and pumping booster. It's the mobile bituminous team that does more work . . . with faster heat, higher temperatures and with less fuel. Write for details. Cleaver-Brooks Company, Dept. M, 395 E. Keefe Avenue, Milwaukee 12, Wisconsin.

TANK CAR HEATER — Shoots steam through tank-car coils at 125 lbs. pressure in 20 minutes or less from a cold start. Can be kept going at full tilt all day. Oil firing plus extra high-heat transfer design, assure extra fuel savings. Turbine-type condensate return means less water required. Available in two-car (28 BHP) and three-car (42 BHP) sizes, trailer and skid-mounted models. Ask for Bulletin RM-110.



PUMPING BOOSTER — Heats by direct firing 4 times as fast as steam, recirculates, then delivers bituminous materials directly to distributor. Heats only the amount of material required — not necessary to heat entire car. No steam or water required for operation. Has self-contained fuel and gasoline tanks. Available in two sizes, trailer and skid mounted: No. 1A Booster heats approx. 300 GPM temp. rise 25°-35°F; No. 2 Booster heats approx. 350 GPM temp. rise 45°-55°F. Ask for Bulletin RM-107.

"DEUCE", COMBINATION TANK CAR HEATER AND PUMPING BOOSTER — It's a portable steam boiler *and* direct-fired heater mounted on a single frame. Look at this three-job versatility! "Deuce" steam preheats one car to pumpable consistency while circulating and heating a second car to application temperatures. Same unit also pumps and loads distributor or transfer truck. Ask for Bulletin AD-104.

Cleaver-Brooks

Pioneers and Originators of Self-Contained Boilers, Tank-Car Heaters, Pumping Boosters, The "Deuce" and "Peak-Temp"

. . . for more details circle 190, page 16

Manufacturers' Literature

"3 in 1" Material Handling Tool

The story of low cost material handling with "3 tools in 1" Moto-Bug is graphically presented in an attractive 8-page catalog published by the Kwik-Mix Co., Port Washington, Wis., a subsidiary of the Koehring Co., Milwaukee. By providing three easily interchanged attachments — hopper, platform and forklift — for one standard chassis, the Moto-Bug can load, lift or haul all types of materials with one basic unit. Numerous photographs are used in the new 2-color catalog to illustrate the structural features incorporated in each model and depict the many material handling assignments that are applied to Moto-Bug.

For more information circle 145 on Service Coupon Page 16 and mail now.

Drilling Tools and Supplies

A new 40-page catalog issued by Acker Drill Co., Inc., Scranton 3 Pa., contains a complete and up to date listing of drilling tools and supplies used in soil-sampling and drilling to moderate depths. The catalog, which contains 152 illustrations, is divided into seven sections: (1) Drill bits and core barrels; (2) Drill rods and rod handling accessories; (3) Flush coupled casing, drive pipe and associated tools; (4) Soil sampling equipment; (5) Shot drilling tools and accessories; (6) Auger tools; and (7) Miscellaneous drill supplies.

For more information circle 146 on Service Coupon Page 16 and mail now.

Two New Caterpillar Engines

Announcement of two new engines, the D342 and D339, has been made through the recent publication of a broadside mailing-piece (Form 31554) by Caterpillar Tractor Co., Peoria 8, Ill. Included in the two-color publication is a full explanation of the machining and research going into the production of these latest additions to the company's line. Pictures illustrate clearly the "long life" features built into the two modern heavy duty engines by Caterpillar engineers. The low maintenance and operating cost of the machines is detailed by graphic explanations of the money saving fuel system, and factory produced parts. Special production methods used in the machining of crankshafts, camshafts and heads are shown to lengthen engine life and decrease down time. A series of two-color pictures illustrate the applications — ranging from marine to logging to industrial — where the Cat D342 and D339 will provide power for their owners.

For more information circle 147 on Service Coupon Page 16 and mail now.

3 Cu. Yd. Shovel

A new 16-page bulletin (71-B-1) describing the Bucyrus-Erie 71-B shovel (3-cu. yd. capacity) is available from Bucyrus-Erie Co., South Milwaukee, Wis. Pictorially illustrated, the booklet gives a complete description of the machine's features along with a list of general specifications. The Model 71-B is readily convertible to dragline, clamshell or lifting crane and incorporates the basic engineering features and fieldproved advantages of the company's current line of general purpose excavators. It is powered by a 6-cylinder GM diesel engine equipped with Torcon torque converter. (Diesel engine with conventional drive also available). Other features described in easy reading style are: positive twin rope balanced crowd with rectangular inside dipper handle; strong light boom; fully independent boom hoist; full air control except for drum brakes and swing and propel jaw clutches; steering clutches and friction digging brakes spring set and air released; one-piece cast steel revolving frame; choice of four A-frames; 12 conical hook rollers, and four optional crawler mountings.

For more information circle 148 on Service Coupon Page 16 and mail now.

Construction and Maintenance Of Irrigation Systems

"Construction and Maintenance of Irrigation and Drainage Systems" is the title of a 6-page, profusely illustrated folder issued by the Warner & Swasey Company, Gradall Division, Cleveland, O. This folder shows the multi-purpose Gradall machine at work on a variety of spectacular irrigation and drainage projects from California to Florida and from the Salt River Valley to Puerto Rico. The photos in the new folder show Gradall machines grading slopes, laying pipe, trenching, digging ditches with formed buckets, moving logs by use of the Gradall grapple, placing rip-rap, pouring concrete, and canal excavation. Many of the Gradall special attachments are shown at work in the pictures in the new folder.

For more information circle 149 on Service Coupon Page 16 and mail now.

Equipment Maintenance and Service Tools

Owatonna Tool Co., 435 N. Cedar St., Owatonna, Minn., has issued manuals of complete data on factory-approved tools and sets for maintenance and service jobs: Bulletin LW-55 for LeTourneau-Westinghouse equipment and Bulletin OC-55 for Oliver industrial tractors. The bulletins are thoroughly illustrated with photographs, cross-sections and action

Simplicity Air Washers *ELIMINATE SMOKE and DUST*

Prevent or settle many court orders and lawsuits • Improve morale of the plant crew

Protect expensive machinery from destructive dust and smoke • Improve public relations

Simplicity Air Washers are inexpensive but highly efficient. They are a part of most Simplicity Asphalt Plants and have been successfully added to other makes of plants.
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pictures. Applications include installation and removal of axles, gears, wheels, bushings, pinions, drive flanges, bearings, bearing cups, shafts and sleeves. The bulletins also cover in detail the components of several new mechanical and hydraulic tool sets, said to be capable of handling 98% of the pulling and installing jobs for the two makes of equipment.

For more information circle 150 on Service Coupon Page 16 and mail now.

Dump Bodies, Hydraulic Hoists

A new 4-page catalog (No. 325) describing the company's complete line of dump bodies, hydraulic hoists, trailer dumps, hydraulic Load-N-Gates and special truck equipment, has been announced by Hercules Steel Products Co., Galion, O. The new 2-color catalog lists models, capacities and recommended applications. It covers Hercules' line of contractor, rock, excavator, Morgantown and platform bodies as well as underbody, front telescopic, dump trailer and farm conversion hoists. Also included are 3 Load-N-Gate models plus fertilizer, cinder and cement spreaders. Ilustrations show each basic model type.

For more information circle 151 on Service Coupon Page 16 and mail now.

Suspension Hopper Scales

The Webb Corporation, Webb City, Mo., has released an attractive and informative 4-page folder on their various types of suspension hopper scales which are widely used for mixing, proportioning or batching of various ingredients in many industrial fields. The scales are all steel construction, featuring hardened steel pivots and bearings (self-aligning). The scales can be equipped with dial indicators or with weigh beams as desired. The new brochure describes and illustrates a wide variety of styles and sizes of scales used in industries.

For more information circle 152 on Service Coupon Page 16 and mail now.

Hydra-Boom Bulletin

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., announces a new 12-page Hydra-Boom bulletin (Form 4162) covering their complete line of hydraulic booms for use in the construction and mining industry. The bulletin thoroughly covers Hydra-Boom applications in construction work and in mining and tunneling. It contains information on booms mounted on tractors, tunnel jumbos and self-propelled air operated rigs. It also contains dimensioned coverage diagrams showing the area that can be covered by each boom, both vertically and horizontally. There is information on special Jumbo mountings including a four-boom, self propelled machine for drilling a face 40 ft. high underground.

For more information circle 153 on Service Coupon Page 16 and mail now.

Street Sign Hanging Equipment

A new brochure describing and illustrating street sign hanging tools, equipment, and kits that make sign-hanging a quick, economical long-lasting job is available from A. J. Gerrard & Co., Melrose Park, Ill. The 4-page catalog spot-lights the A. J. Gerard bracket assemblies that allow sign changing without removing the supporting strap. Special supports for one or more signs, and for off-the-street hanging, are also illustrated.

For more information circle 154 on Service Coupon Page 16 and mail now.

Pipe Joint and Fittings

A new 32-page booklet entitled "Warren-Spun Mechanical Joint Pipe and Fittings" has been published by Warren Foundry & Pipe Corp., 55 Liberty St., New York 5, N. Y. Detailed method of installation, standard dimensions, thicknesses and weights and a table of standard sizes, classes, thicknesses and weights of Warren-Spun pipe are given.

For more information circle 155 on Service Coupon Page 16 and mail now.

(For more items see page 147)

MORE THAN 80% OF ALL PAVED ROADS ARE NOW SURFACED with ASPHALT

CUMMER BATCH-TYPE ASPHALT PLANTS. . . . CONSISTENTLY PRODUCE RECORD TONNAGES WITH LESS DOWN-TIME

You can't beat the actual experience of "old hands" who have been operating Cummer Asphalt Plants for years when it comes to telling the real story behind Cummer equipment.

Such an "old hand" is Mr. Henry W. Jenkins, Vice-President of the Savannah Asphalt Company of Georgia. Mr. Jenkins says, "Our Cummer Portable Asphalt Plant—shown in the picture above—is rated at 60 to 70 tons per hour capacity. It's been delivering that in the three years we've owned it, and we're still surprised at how little we've had to shut down for repairs and replacements. The way we figure it, ruggedness and efficiency are built right into these Cummer Plants."

Cummer Asphalt Plants are batch-type complete with all motors and starter switches and all moving parts are individually motor driven.

Write now for your copy of the fully-illustrated Cummer catalog giving complete specifications on all plants and accessories.

CUMMER

THE F. D. CUMMER & SON CO.
1827 EAST 18th ST. • CLEVELAND 14, OHIO

. . . for more details circle 193, page 16

● Strands of rubberized asphalt clinging to wheel of rotary broom.

● Comparing the adhesion of non-rubberized (left) and rubberized (right) asphalt to the chips after 24 hours of curing.

Rubberized asphalt

(Continued from page 133)

passes at the rate of 0.25 gal. per sq. yd. The chip spreader of Figure 4 laid the clean ⅜ in. stone chips at the rate of 20 lb. per sq. yd. A Galion 8-ton 2-axle smooth steel roller made three rollings within 3 hours at a velocity of 5 mph after the chips were spread. This was followed by two passes of a Ferguson 13-ton self-propelled 11-tired pneumatic roller with a 77 in. tire tread. Within 7 hours the road was open to traffic.

Tips for Handling RC-3D

No special precautions, extra equipment, or additional labor were necessary in order to use RC-3D. From the practical point of view, Mr. Loeper offered several valuable tips:

1. A higher pressure in the distributor pump. In this case 40 psi was recommended for the RC-3D instead of the 20 psi used for an ordinary RC-3.
2. A 3-5 minute delay before spreading the chips on the freshly applied asphalt. The purpose of this step is to allow the asphalt to form a uniform film completely devoid of pinholes.
3. Complete coverage of the RC-3D film with chips followed by brooming of the 3-in. strips just before the adjacent lane is shot with asphalt. This is in contrast to the normal practice of leaving a 6 in. unchipped seam between the edge of the chipped lane and edge of the sealed lane.

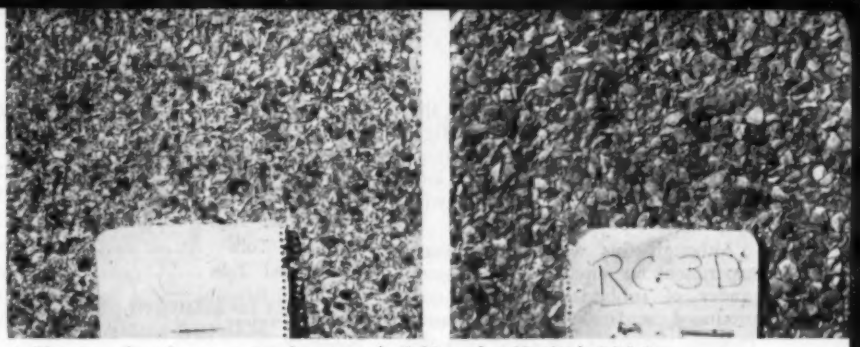
Marked Contrast

During the brooming operation a remarkable contrast between rubberized and unrubberized seal coats was observed. Figure 5 shows the rear wheel of the broom as it rolls through the freshly swept edge of the RC-3D. Long tough rubbery strands of rubberized asphalt formed a web of tan-

● Mold of rubberized residue about to be stretched in field demonstration.

● Mold after stretching out to 9 ft. After photo was taken, stretching continued to rear wheel of truck seen in background.

Readers wishing samples of rubberized materials from this test project may obtain them by writing to Husky Oil Co., Cody, Wyoming, attention F. B. Adasz.



● Close-up of surface texture of untreated (left) and rubberized (right) section after completion.

gents to the rear tire as it passed through the freshly swept rubberized asphalt. This phenomenon did not occur when the tire passed through the freshly swept unrubberized sealcoat.

The retention qualities of rubberized and unrubberized sections of the pavement after 24 hours curing time are demonstrated by the accompanying pictures. Figure 6 shows a handful of chips which were easily scraped from the unrubberized section. Notice how the rubberized handful had adhering chips on the threads connecting to the pavement.

A ductility mold containing a sample of residue from the vacuum distillation of RC-3D is held by William Loeper of the Highway Department and Jess Moore of the Taggart Construction Company in Figure 8. When pulling the molds containing the rubberized asphalt, a characteristic rectangular cross-section of the thread is always evident. This is in distinct contrast to the circular cross-section of unrubberized asphalts. The two men have drawn out the thread about 9 ft. in Figure 9. Ultimately the thread was drawn past the rear wheel of the truck shown in the right background of Figure 9. It still had not broken but was dragging on the ground.

In the months and years to come this experimental section of road will be closely observed so that an economical appraisal can be made. One of the techniques applied to this study will be to follow the chip retention by means of photographs such as those in Figures 10 and 11. The former is the unrubberized sealcoat, RC-3; the latter is rubberized sealcoat, RC-3D. Four 12-in. square sections were permanently marked by driving 3-in. aluminum nails into the pavement. Additional pictures will be taken at these same points as time goes on.

If RC-3 had been used exclusively on this experimental project the total cost to the highway department would have been $1833.81 or 8.4 cents per sq. yd.; if RC-3D had been used exclusively the total cost would have been $2489.66 or 11.4 cents per sq. yd. Obviously this extra cost of 3 cents per sq. yd. must be justified in extra advantages over ordinary RC-3.

The purpose of the experiment is to quantitatively evaluate the tangible advantages of better chip retention and less maintenance, and attempt to place an economic value on them. For instance, the present thinking is that if the life of the sealcoat is extended by a time period proportional to the increased cost, that is, by 35.8%, the cost of the RC-3D will be justified. If the life is extended for a period greater than this, then the RC-3D will have been used at a net

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. . . for more details circle 264, page 16

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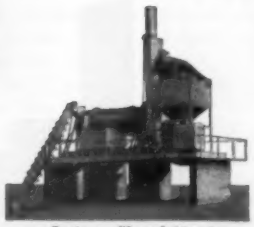

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reduction in cost. Consequently, this has the effect of permitting the Highway Department to maintain more roads in better condition with a lower inventory of equipment, and with the same manpower.

Although this was a preliminary experiment on only one of the many grades of rubberized asphalts now produced at Husky by the Benson Process, the goals are clear and the experiment is a fundamental part of a long range planning program which, in the end, will lead to the attainment of the ultimate goal — better roads and safer roads at lower cost.

The authors gratefully acknowledge the cooperation of the Taggart Construction Company, Cody, Wyoming and of W. F. Loeper of the Wyoming State Highway Department. The drawing and the cost comparison were prepared by Paul Nemeth of the Highway Department.

Record traffic on thruway

Traffic and revenue totals on the New York State Thruway over the Memorial Day weekend set records as motorists traveled an estimated 18,000,000 miles with only five personal injury accidents and no fatal mishaps.

The peak traffic occurred on Monday, with motorists traveling more than 5,000,000 miles. There were 67,000 vehicle trips and toll revenue of $70,000.

New monthly traffic and revenue records were also announced by the thruway authorities with toll revenue 17.5 percent higher and mileage 19.9 percent higher in May than in April. Passenger car trips were up 22.5 percent, as anticipated from steadily increasing vacation travel.

The statistics for 1955 through May 31 follow:

	Jan. 1, 1955 Thru Apr. 30	May	1955 Total
Passenger Vehicle Trips (Excluding Permits)	1,773,473	720,430	2,493,903
Permit Trips	852,826	301,108	1,153,934
Commercial Trips	281,781	93,505	375,286
Passenger Tolls	$1,488,178.65	$678,102.10	$2,166,280.75
Commercial Tolls	$ 922,370.80	$285,294.95	$1,207,665.75
Total Toll Revenue	$2,410,549.45	$963,397.05	$3,373,946.50
Permit Revenue	$ 673,657.50	$ 52,096.50	$ 725,754.00
Permits Sold	33,682	2,605	36,287
Miles Traveled	176,648,128	74,809,282	251,457,410
Average Trip-Passenger	58	66	60
Average Trip-Commercial	85	84	85
Overall Average Trip	61	67	63

• Burl A. Sawyers of Charleston has been appointed Commissioner of the West Virginia State Road Commission. He succeeds H. K. Griffith, who resigned June 30. Sawyers is a registered professional engineer, who was formerly Governor Marland's Administrative Assistant.

• Control of highway access. A summary of state legislation with 1955 enactments included, this is a comprehensive research report prepared by J. Allyn Preston for the National Highway Users Conference. For copy address the Conference at National Press Building, Washington 4, D.C.

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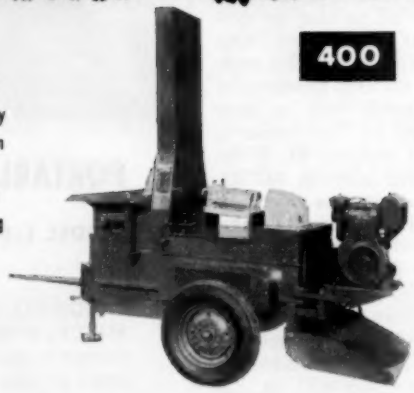

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. . . for more details circle 240, page 16

Paving plant inspectors or paving material engineers?

(Continued from page 131)

analyze the results.

The inspector should be trained to realize that the control tests have a definite relationship one to the other, and that results of one test will often be in harmony with or be confirmed by the results of another. This relationship will carry on through to the extent that the inspector can predict with reasonable accuracy what to expect from other tests; for instance, the Stabilometer Test which cannot be made at the plant.

In summation, let us make materials inspectors out of our plant inspectors. Let us put this inspection on an engineering basis, supported by physical tests, instead of making serious and costly decisions based solely on "opinion" and visual observation. Let us know what we want. Let us test by an accepted method to determine whether we are getting it. And thus let us give the responsibility of producing the desired results back to the producer who expected to carry this responsibility when he bid the job.

Concrete manual of the Reclamation Bureau

Engineers and construction men everywhere will be interested in the sixth edition of the Concrete Manual of the U. S. Bureau of Reclamation. Size 4½" x 7¼"; 491 pages.

This supplants the previous edition dated 1949, having been rewritten or supplemented to reflect advancements in the practice of the Bureau.

New data are presented on factors influencing strength of concrete. As a result of increased knowledge of concrete behavior involving air-entraining agents and pozzolans, type 1 cement has found wider use in Bureau work and is so recommended.

Precautions are given for the use of calcium where sulphate attack is expected, because test results have shown that this admixture may impair the resistance of concrete to this attack.

The Manual describes effective methods of protecting new concrete during freezing weather by insulation of forms. A simpler test for mixer performance is presented. More detail is included on the repair of cracks in siphons and on repair of concrete pipe.

The procedure has been rewritten for the design and adjustment of concrete mixes, to conform with recommendations of Committee 613 of the American Concrete Institute for selecting concrete proportions. The procedure is simpler and more readily adaptable to field use than the previously recommended procedure.

This popular Manual has had more than 60,000 printings in the past editions and has been translated into Spanish, Italian and Japanese languages.

The editors note that instances occur in the Manual in which the procedures and instructions are at variance, in some respects, with specification requirements. In such cases, it is understood that the specifications take precedence.

The Manual is issued from the Office of the Assistant Commissioner and Chief Engineer of the U. S. Bureau of Reclamation and was prepared by the Engineering Laboratories of the Bureau in Denver. The price is $2.00, postage free, in the United States, Canada, Central and South America, Cuba, Dominican Republic, Haiti, Mexico, Newfoundland, Spain and U. S. territories and possessions. Postage should be added from all other countries.

Please remit in U. S. currency or draft on a New York bank.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C., and the Bureau of Reclamation, Denver Federal Center, Denver, Colorado, attention: 841.

State of California
Division of Highways

PLANT AUDIT Date _____

Dist. ____ Co. ____ Rte. ____ Sect. ____ Cont. No. ____

Limits ____ Contractor ____

Res. Engr. ____ Pl. Insp. ____ St. Insp. ____

Plant Facilities

Type of Plant ____ Make & Model No. ____

No. of Bins ____ Screen Sizes ____

Type & Source of Agg. ____

Cold Elev. Feed ____ No. Stkpls. ____ Type Feeders ____

Temp. Agg. in Hot Elevator ____ Pyrometer Check ____ Moist. after Drying ____

Effectiveness of Plant Screens ____

Bin Segregation ____ Uniformity of Mix ____

Accuracy of Plant Scales. Aggregate ____ Asphalt ____

Accessibility for Sampling. Bins ____ Pug Mill ____

% Asph. by CKE ____ Using ____ Appearance of Mix ____ K-Value ____ C ____ F ____ M ____

Segregation in Pug Mill ____

Engineer's Facilities for Control

Equipment	Yes	No		Condition
C.K.E.				
Balances				
S.E.				
Sample Splitter				
Sieve Shaker				
Ovens				
Thermometers				
Moist. Xylene Reflux				

Plant Records ____ Graphic Record Yes ____ No ____

Frequency of Sampling ____ Sufficient ____ Insufficient ____

Method of Obtaining Asph. Samples ____

Type of Asphalt ____ Type of Mix ____

Remarks: ____

T-399-53 Hdqrs. Representative

● Form sheet used for asphalt plant audit by California Division of Highways inspection personnel.

● Walter G. Johnson, 56, engineer of secondary roads for the past ten years, has been named chief engineer for the Kansas State Highway Commission. He succeeds Ross C. Keeling, who resigned in October to join Howard, Needles, Tammen & Bergendoff, consulting engineers. Johnson has been associated with the Kansas Highway Commission since 1928. Prior to joining the Commission he worked with the Colorado State Highway Department.

JUST OFF THE PRESS

Technical Glossary — Glosario Técnico

An authoritative book written by the U. S. Bureau of Public Roads on Bridge, Highway, Construction, and Soils Engineering Terms

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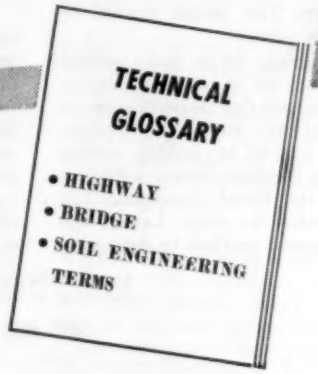

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TECHNICAL GLOSSARY is a much needed work for use in translating English technical material into Spanish, or Spanish technical material into English, in order to convey the exact same idea and meaning to the reader of either language.

THIS BOOK was in process of preparation for a period of fifteen years. The preparation cost was in excess of $45,000.

The need of a specific glossary or dictionary of terms of this type has long been felt. After several International conferences between representatives of the U. S. Bureau of Public Roads and Latin American engineers, a decision was reached to prepare such a glossary. To further extend its usefulness, soil stabilization and associated laboratory work was included.

The manuscript for this book of over 35,000 terms was over 15 years in preparation under E. W. James, then Chief, Inter-American Regional Office, U. S. Bureau of Public Roads, working with the Library of Congress of the United States. It has been approved by a committee of five bilingual engineers of the Mexican government under the chairmanship of Sr. Ing. J. Fco. Rodríguez Cabo. It was then submitted to and approved by the "Academia Mexicana Correspondiente de la Academia Real Española" under the chairmanship of Sr. Don Martín Luis Guzmán, distinguished author, editor and publicist, also publisher of "El Tiempo."

It was then submitted to the V Pan American Highway Congress where a resolution was adopted commending the venture and recommending that the manuscript be published.

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Manufacturers' Literature

Bitumuls for Surface Course Mixes

New 12-page bulletin, available from American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 11, Calif., describes and illustrates the uses of Bitumuls emulsified asphalt for rapid mixing with economical aggregates in the construction of durable pavements. The product offers fast, efficient mixing with cold aggregate to reduce overall costs of operation. It is adaptable to all methods of mixing and may be used with all conventional equipment — blade grader, rotary tiller, traveling mix plant, central plant pug-mill (continuous or batch-type) or rotary drum mixer. The new bulletin covers typical Bitumuls applications in all parts of the country. A description of Bitumuls laboratory service for proper analysis of aggregates is also included.

For more information circle 156 on Service Coupon Page 16 and mail now.

Rubber Pipe Joints

A booklet, "Joint Enterprises" describing Tylox rubber joints for coupling pipe used in sewerage, drainage and waterworks projects, is available in new format from Hamilton Kent Manufacturing Company, producers of Tylox joints. This new brochure gives the history of the development of rubber pipe joints, and complete information and data on Tylox. The booklet also contains illustrated case histories of Tylox-jointed installations, and suggestions to assist engineers in specifying Tylox joints for both tongue and groove, and bell and spigot pipe. Copies may be obtained by writing to: T. S. Rowe, President, Hamilton Kent Manufacturing Co., 427 West Grant St., Kent, O.

For more information circle 157 on Service Coupon Page 16 and mail now.

Handy Reference Wall Chart For Cars and Trucks

A new 4-page 12 x 18 in. chart with complete fan belt, hose and car mat specifications data for all popular passenger cars and light trucks, including 1955 models, is available from the Raybestos Division of Raybestos-Manhattan, Inc., Bridgeport 2, Conn. A special section gives information on where to cut Raybestos universal curved radiator hose and specification data for Raybestos rayflex wire reinforced radiator hose. Instructions on installing fan belts on most passenger cars and light trucks are written in readable fashion and illustrated with diagrams.

For more information circle 158 on Service Coupon Page 16 and mail now.

Oil Filters

Engine life depends in a large measure on effective oil filters to keep harmful abrasives away from vital parts. In "Filter Research, How and Why. . ." a new booklet (Form DE583) published by Caterpillar Tractor Co., Peoria 8, Ill., the story behind the developement of effective oil filters is told. This 8-page booklet starts at the Caterpillar test stands, carrying through testing in engines in the laboratory and the field to the final design resulting from conclusions.

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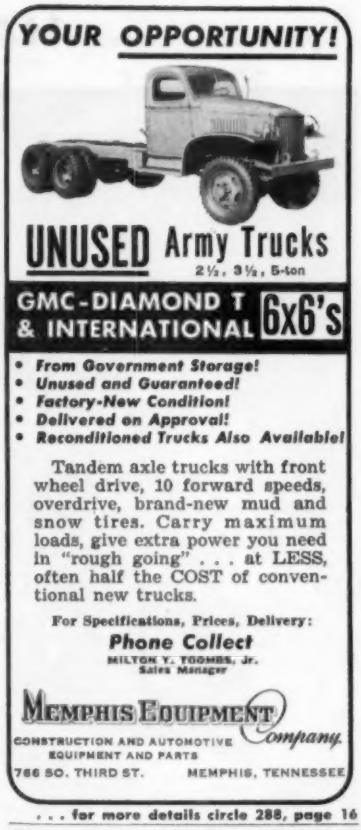
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SOHIO ASPHALT

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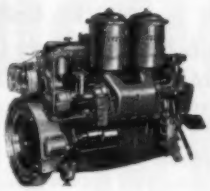

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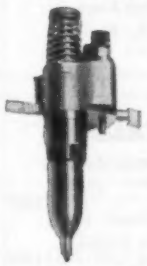

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One Austin-Western 99H — Serial No. 2378, Completely Rebuilt, New Tires.

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One International ID9 — Serial No. DCB-8529, Completely Rebuilt.

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H. M. McGLOTHLIN & SON completed more than 80 trenching jobs in less than two months early this year with their Model 92 Cleveland trencher. Digging in the coral rock in and around Homestead, Florida, their Cleveland is in almost constant use cutting trenches for the city's pipe and sewer lines and house footings for building contractors. McGlothlin says his Cleveland works twice as fast as another type trencher he formerly used, is more maneuverable and requires less maintenance. Your local distributor will show you how Clevelands *dig more trench . . . in more places . . . at less cost.* THE CLEVELAND TRENCHER CO., 20100 St. Clair Ave., Cleveland 17, Ohio

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More Power, Lighter Weight, More Compact

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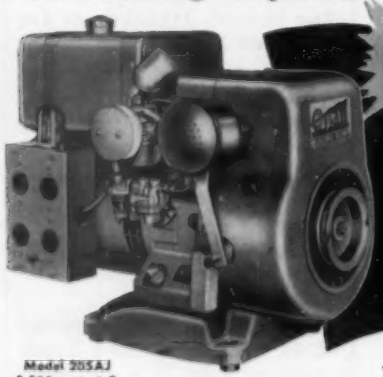

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These new power-packed electric plants are smaller . . . lighter . . . easier to take along and move around. Model 205AJ shown here weighs only 154 pounds . . . *yet it develops 2,500 watts A.C.*

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Onan Portable Electric Plants: 500 to 5,000 watts.

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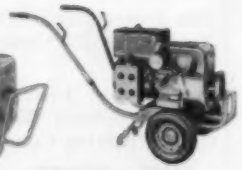

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With the Manufacturers and Distributors

HARNISCHFEGER APPOINTMENTS. J. F. Catalane has been appointed general sales manager of the new P & H Construction and Mining Division of Harnischfeger Corporation, Milwaukee, Wis. With the assumption of his new duties, Mr. Catalane also became a member of the Harnischfeger Corporation Executive Committee. He also continues as sales manager of the Power Crane and Shovel Division. Appointed assistant general sales manager of the Construction and Mining Division was Robert P. Jones, and Raymond A. Ehn was named assistant sales manager, Power Crane and Shovel Division.

EXPORT SALES MANAGER FOR TERRATRAC. Robert Fromberg has been appointed to the newly created position of export sales manager for American Tractor Corp., Cherubusco (Ft. Wayne), Ind.

APPOINTED SALES REPRESENTATIVE. Crusher Engineering Division of Poor & Company, Philadelphia, Pa., has appointed as sales representative, the Wharton L. Peters Machinery Co., 3863 West Pine Boulevard, St. Louis, Mo. Sales territory includes the entire state of Missouri plus the southern counties of Illinois and Indiana.

ESCO ANNOUNCES NEW INTERNATIONAL DIVISION. Establishment of Esco International, a new division created to handle its large volume of export business, has been announced by Electric Steel Foundry Co., Portland, Ore. Main office of Esco International is located at 420 Lexington Ave., New York City under the direction of Ed. T. Hewitt.

WAYNE PROMOTES KINGMAN. William M. Kingman, heretofore, Wayne district sales representative in the Mid-western states, has been appointed to an executive position by Wayne Manufacturing Co., Pomona, Calif. His duties will be concentrated on administration of the company's new industrial sweeper program.

NEW THOR PITTSBURGH MANAGER. Harry L. Artinger, a Thor industrial service engineer in the Pittsburgh, Penn., area for the past 10 years, has been named Pittsburgh branch manager of Thor Power Tool Co., Aurora, Ill.

HANDLAN APPOINTS EXCLUSIVE SALES REPRESENTATIVE. Handlan, Inc., St. Louis, Mo., manufacturers of oil and electric lamps, lanterns and torches, has appointed John H. Graham & Co. Inc., New York, N. Y. as exclusive sales representatives.

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AIR ENTRAINING AGENT

1. Liquid can be added to gauge water or introduced into mix
2. Provides greater control — more flexibility to meet individual specifications
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Write for complete details and illustrated circular.

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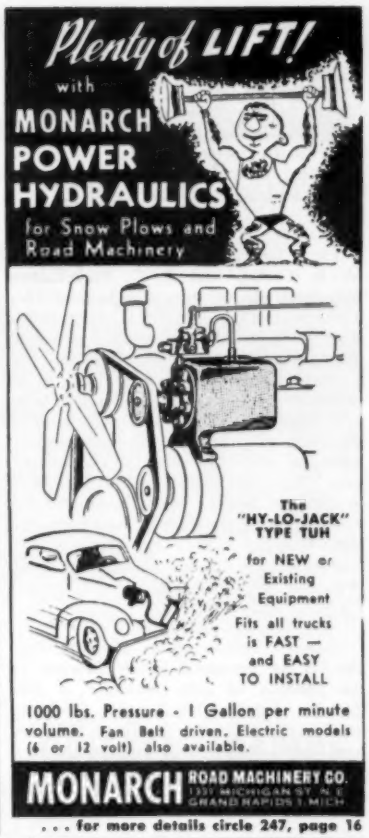
GAR WOOD INDUSTRIES PROMOTES O'BRIEN. Angus J. O'Brien, heretofore vice president and director of manufacturing for Gar Wood Industries, Inc., Wayne, Mich., has been appointed to the newly created position of vice president and director of engineering and manufacturing. He will be responsible for all of Gar Woods' manufacturing and engineering activities.

NEW MARION DISTRIBUTORS. Marion Power Shovel Co., Marion, O., has appointed the following new distributors: Southern Machinery Co., Inc., Durham, N. C., for state of North Carolina; B. L. Montague Co., East Liberty St., Sumter, S. C., for state of South Carolina; and Western Machinery Co., 2400 West 7th Ave., Denver, Colo., for state of Colorado.

WILLETTS NAMED SALES MANAGER. Russell L. Willetts has been appointed Sales Manager, Engine Division, Sheppard Diesels, Hanover, Pa. He has been with the company for 8¾ years.

NEWTON HEADS GOODMAN ENGINEERING. John S. Newton, formerly vice president and manager of the testing equipment division of Baldwin-Lima-Hamilton, Eddystone, Pa., has been appointed vice president in charge of engineering, for Goodman Manufacturing Co., Chicago, Ill. He will be actively engaged in Goodman's Mining Machinery Division.



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STEARNS ELECTED EXECUTIVE VICE PRESIDENT. Jack C. H. Stearns, in an executive position with the Dow export companies for the past year and a member of the export board of directors, has been elected to the newly created office of executive vice president of Dow Chemical International Limited and Dow Chemical Inter-American Limited.

THEW SHOVEL ELECTS NEW OFFICERS. M. B. Garber and E. C. Brekelbaum have been elected vice presidents of The Thew Shovel Co., Lorain, O. C. B. Smythe, president, has been elected treasurer of the company to replace the late H. L. Reynolds, and will carry the title of president-treasurer. Mr. Garber has been with Thew for 28 years as assistant sales manager, general sales manager, export manager and, most recently, director of sales. Mr. Brekelbaum came to Thew in 1952 as director of methods after 17 years of association with the Harnischfeger Corp. of Milwaukee, where his last post was as vice president and executive chief engineer.

MORGAN PROMOTED BY HYSTER. Hyster Co. has promoted Joe W. Morgan to the position of sales manager of the Eastern Tractor Equipment Division, headquarters, Peoria, Ill. Since 1952 he had been assistant sales manager of Hyster's Eastern Industrial Truck Division in Danville, Ill.

NEW SALES REPRESENTATIVES FOR WOOLDRIDGE. Three additional sales representatives have been appointed by Wooldridge Mfg. Co., Sunnyvale, Calif.: Edward D. Wallace now represents Wooldridge in Minnesota, Wisconsin, Iowa, Illinois, Indiana, Ohio, Michigan and Eastern Missouri. T. Robert Kyper is now serving in a similar capacity in Oklahoma, Kansas, Nebraska, Missouri and Arkansas. Representing Wooldridge in California, Nevada, Arizona, New Mexico, Utah and Colorado is Frank L. Johnson.

OTTAWA STEEL APPOINTS RAYBACH. Richard J. Raybach, formerly in charge of sales in eastern United States, for Ottawa Steel, has been appointed general sales manager of Ottawa Steel Division of L. A. Young Spring & Wire Corp., Ottawa, Kan.

BYRON JACKSON NOW BORG-WARNER DIVISION. Byron Jackson, pioneer west coast manufacturer of pumps, oil tools and electronic equipment has become the Byron Jackson Division of Borg-Warner Corporation. The change became effective as of Sept. 1, 1955. The present management and policies will be continued. E. S. Dulin, president of Byron Jackson, has been named president of the new division of Borg-Warner and all Byron Jackson officers have been appointed as officers of the division.

CLAYTON MANUFACTURING CO. ANNOUNCES DISTRIBUTORS. Clayton Manufacturing Co., El Monte, Calif., manufacturer of the Summeraire portable space heater, has announced a list of exclusive territorial distributors in the construction field. They are as follows: Anderson Equipment Co., Pittsburgh, for West Virginia and Western Pennsylvania; Western Machinery Co., Denver, for the State of Colorado; Palmer Equipment Co., Detroit for the Counties of Washtenaw, Monroe, Wayne, Oakland, Macomb and St. Clair in the State of Michigan; Cleveland Contractors Equipment Co., Cleveland for Northeastern Ohio; Lorenz Equipment Co., Columbus, for Central and Southwestern Ohio; Trevor Corporation, Buffalo for Western New York; Western Machinery Co., Salt Lake City for Utah, Southern Idaho and Eastern Nevada; Construction Equipment Co., Ltd., Edmonton, Alberta, Canada for the Provinces of British Columbia, Alberta, Saskatchewan and Manitoba and Construction Equipment Co., Ltd., Montreal for Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland.

NEW GRADALL DISTRIBUTORS. Three new distributors for the multi-purpose Gradall, have been appointed by the Gradall Division of The Warner & Swasey Co., Cleveland. The Western Traction Co., 2230 Third St., San Francisco., Calif., has been given the exclusive terri-

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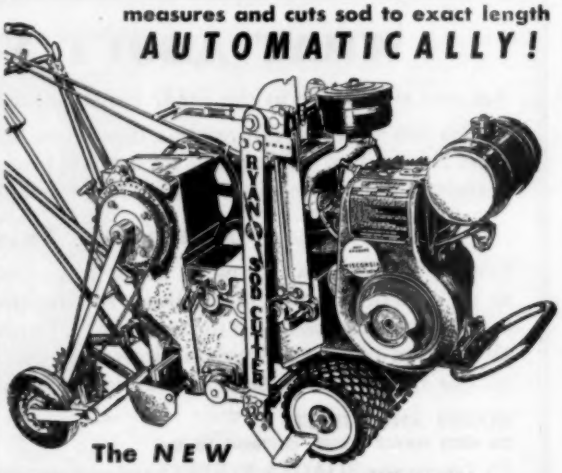
measures and cuts sod to exact length
AUTOMATICALLY!



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cuts 15 sq. yds. of sod per minute
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St. Paul 1, Minn.

. . . for more details circle 256, page 16

tory that includes the northern part of the state of California including Fresno, Sacramento, and San Francisco where offices of Western Traction Company are located. The Funkhouser Machinery Co., 2424 Jefferson St., Kansas City, Mo., has been assigned an exclusive territory that includes the state of Kansas east of and including the counties of Jewell, Mitchell, Lincoln, Ellsworth, Chase, Woodson, Wilson, and Montgomery, and the state of Missouri west of and including the counties of Putnam, Sullivan, Linn, Chariton, Howard, Cooper, Maniteau, Miller, Camden, Laclede, Wright, Douglas, and Ozark. The Road Machinery & Supplies Co., 210-212 East First St., Duluth, Minn., will handle the Gradall for the entire state of Minnesota.

TRUCK SALES PERSONNEL CHANGES BY I-H. Three transfers and a promotion among International truck field sales executives have been announced by the motor truck division of International Harvester Co. following retirement of C. A. Samuelson as St. Louis district manager. Barr Crawford, district manager at Pittsburgh, moved to St. Louis in the same capacity. H. A. Herman, district manager at Fort Wayne, Ind., was transferred to Pittsburgh as district manager. M. J. Gowen, district manager at Richmond, Va., moved to the same position at Fort Wayne. R. W. Maxwell, assistant district manager at Richmond, Va., was promoted to district manager at that post. M. T. Sprague has been named Oakland, Calif. district manager to succeed Roy A. Legge, retired.

SCRIBNER TO HEAD 1957 ARBA SHOW PUBLICITY. Harvey A. Scribner, President of Russell T. Gray, Inc., Chicago Industrial Advertising Agency, has been appointed chairman of the 1957 Road Show Publicity Committee by the American Road Builders Association. The show will be held at the International Amphitheatre in Chicago, Jan. 28 through Feb. 2, 1957. Mr. Scribner brings past experience to this appointment as he served in the same capacity for the 1948 Road Show which was held in Chicago's Soldier Field.

MADSEN WORKS APPOINTS NEW DISTRIBUTOR. Madsen Works,, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, 14120 E. Rosecrans Ave., La Mirada, Calif., has appointed the R. S. Armstrong & Bros. Co., 676 Marietta St., N. W., Atlanta 3, Ga., as distributors for Madsen products in the state of Georgia. This distributor will handle both sales and parts service for Madsen asphalt plants and Madsen asphalt plant equipment.

PREMOLDED JOINT MANUFACTURERS FORM ASSOCIATION. A trade association, the Associated Manufacturers of Premolded Joint Materials has been formed. Charter members are: Servicised Products Corporation, Keystone Asphalt Products and the Celotex Corporation, all having general offices in Chicago, and W. R. Meadows, Inc., Elgin, Ill. Other manufacturers of premolded joint materials have been invited to join. Executive offices of the association are at 120 South La Salle St., Chicago, Ill. Officers are: President, F. W. Lagerquist, Celotex Corporation; Vice President, Wallace Fischer, Servicised Products Corporation; Treasurer, W. R. Meadows, Sr., W. R. Meadows, Inc.; and Secretary, J. S. Poole, Keystone Asphalt Products.

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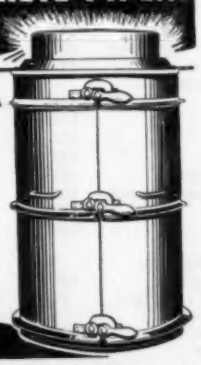
THE Quinn Standard



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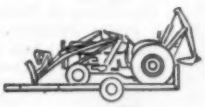
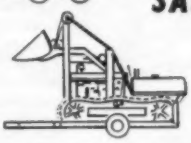
America's Most Advanced Tractor Trailer





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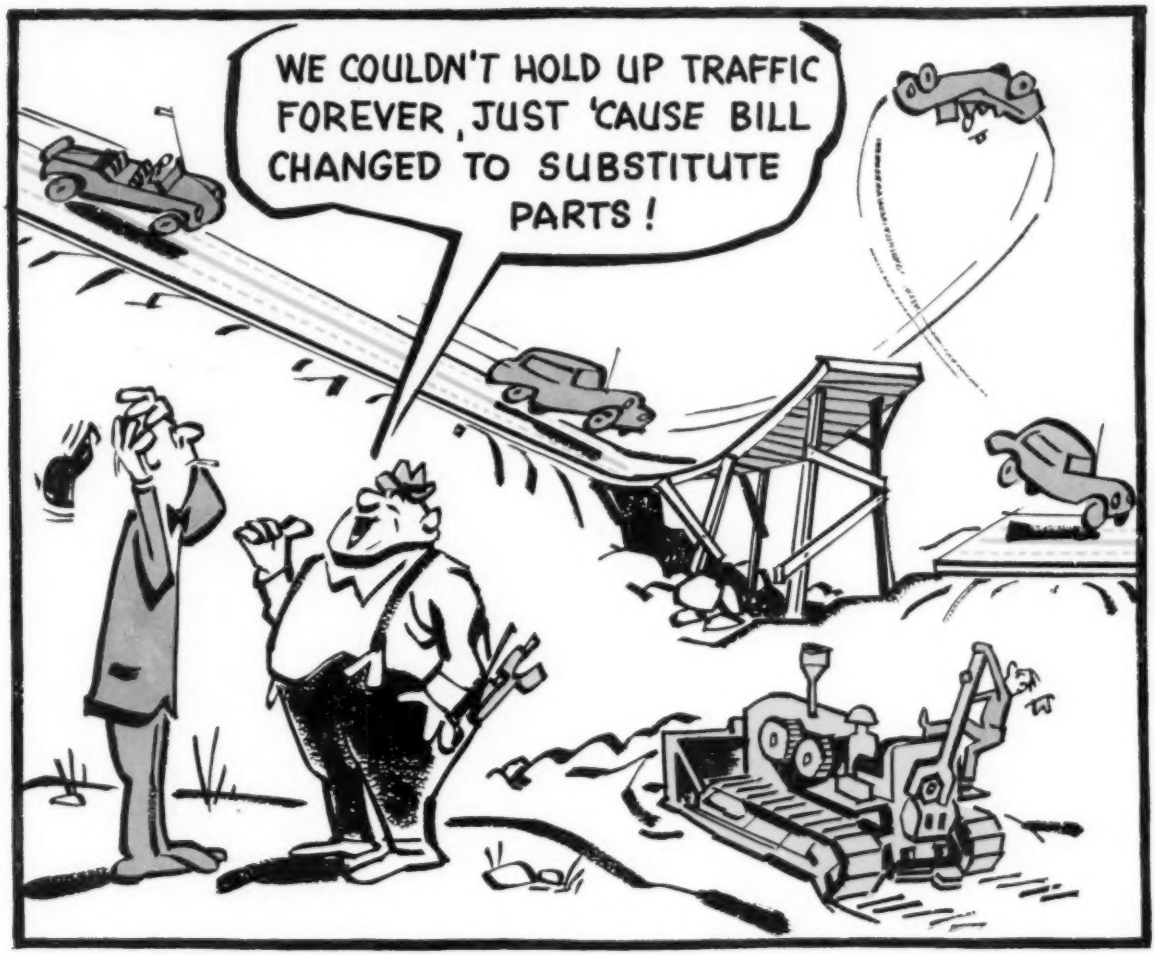


Down time is no joke.

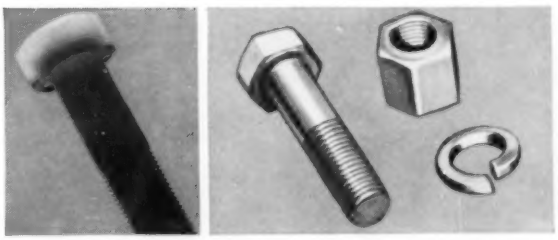
But it happens at times when track hardware gives out.

If you replace with genuine Caterpillar hardware, here's what you're sure of: bolts, nuts, capscrews and lock washers made from prechecked fine-grade steels, carefully hardened and tested, finished to the strictest specifications in the industry. You're sure of longer wear life, no matter how tough your jobs come. You're sure of *less* down time in the future.

If you replace with non-genuine hardware—can you be sure of anything?

Better get Caterpillar parts every time.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.



On the surface, CAT hardware looks like ordinary kind. But etched cross section of newly designed track bolt (left) shows depth of special "Hi-Electro" hardening penetration in bolt head.*

CATERPILLAR*

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This heavy-duty pavement puts emphasis on flexibility

Laying the top course of a 3-inch hot-mix Texaco Asphaltic Concrete surface on a divided highway in southern New Jersey.

The all-flexible pavement constructed on this heavily traveled New Jersey highway has an important advantage, which pays off in greater durability and lower upkeep. Thanks to its top-to-bottom flexibility, it maintains contact with the subgrade continuously and completely. Consequently it is never without the full support of the underlying soil.

The all-flexible design used for the highway in the photograph called for a waterbound macadam base. On other important traffic arteries, either hot-mix Texaco Asphaltic Concrete or Texaco Asphalt (penetration) Macadam has been employed as the base course, according to the volume and weight of traffic to be served.

Using Texaco Asphalt Cements, Cutback Asphalts and Slow-curing Asphaltic Oils, the road builder has a choice of many heavy-duty, intermediate and low-cost types of construction for streets, highways, airports, parking areas, etc. Helpful information concerning all of these types is supplied in two free booklets which can be obtained without obligation by writing our nearest office.

Surface

3 inches of hot-mix Texaco Asphaltic Concrete, laid in two courses.

Base

4 inches of waterbound macadam.

Sub-base

5 to 8 inches of gravel.

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TEXACO

REG. T. M.

TEXACO ASPHALT